THE PRACTITIONER

THE

PRACTITIONER

JULY—DECEMBER 1918

"THE PRACTITIONER," LIMITED:

THE PRACTITIONER.

JULY, 1918.

──────◆●◆──────

REPORT ON AN INVESTIGATION OF 463 CASES OF SUPPOSED DYSENTERY, WITH NOTES ON THE TREATMENT OF SOME WITH AN EMETINE ADSORPTION PRODUCT.

By R. DONALDSON, M.A., M.B., Ch.B., F.R.C.S., D.P.H.,

Bacteriologist in charge of Pathological Department, War Hospital, Reading ; Pathologist, Royal Berks Hospital, Reading, etc.,

Miss A. B. CLARK, B.Sc.,

Assistant, War Hospitals' Laboratory, Reading,

AND

R. C. McLEAN, D.Sc.,

Protozoological Assistant, War Hospitals' Laboratory, Reading.

THE following notes are based on bacteriological and protozoological examinations, carried out in this laboratory on cases admitted between the months of October, 1916, and April, 1917, inclusive—a period of seven months. 476 patients were examined during this period, but as 13 of them arrived with a previous bacteriological diagnosis either of paratyphoid A or B, and as subsequent examinations failed to reveal any other pathogenic infection, these have been omitted from the series.

The figures in this article relate, therefore, to 463 cases, of which 94 only arrived with a reliable laboratory diagnosis. A classification of these is shown in the accompanying table :—

Infection.					
B. Dys. Shiga.	B. Dys. Flexner.	B. Dys. Y.	B. Dys. Shiga et Flexner.	Enta. Histolyt.	B. Dys. Shiga and Ent. Hist.
Per Cent. 41·4	Per Cent. 40·4	Per Cent 1	Per Cent. 1	Per Cent. 14·8	Per Cent. 1

The remaining 357 patients were sent in with a clinical diagnosis of " dysentery " or of " debility following dysentery," with the exception of 16 labelled indefinitely " enteric " or " paratyphoid," whatever may be meant by those terms, both of them misleading if not supported by bacteriological proof. The diagnosis in these cases is, however, of no great value, inasmuch as it was not backed up by bacteriological evidence. The latter alone can be relied on to yield diagnostic information, especially when we consider the frequency with which

A

these cases are infested with a double or triple infection.

For the purposes of this article, however, we shall regard all those cases which bore no bacteriological diagnosis as " dysentery," in view of the fact that this hospital was one of those selected for the reception of dysentery patients. With few exceptions, all the series of 463 patients had passed the acute stage, many, indeed, having been sent here as cases of post-dysenteric debility. The average length of time elapsing between the onset of illness and the date of the first examination made in Reading was 48·4 days. This average is based on the available records of 274 cases. Hence, for the most part, the work resolved itself into a search for carriers either of pathogenic bacteria or of the encysted form of entamœba histolytica.

For bacteriological diagnosis, the centrifugalized deposit from the urine was smeared over two successive plates of MacConkey's medium, while in the case of the fæces a sample was suspended in sterile normal saline and a portion of this plated out as in the case with the urines.

Suspicious colonies were subcultured, and subsequently examined as to their motility and their reaction in certain sugars. Those which passed such tests were subjected to agglutination by a modified Dreyer's method, already referred to by two of us in a previous communication,[1] using the Oxford standard agglutinating sera. Those organisms which failed to become agglutinated by any of the sera were rejected.

When, therefore, in the course of this article a diagnosis of a particular bacillary infection has been made, it is to be understood that the identity of the causal organism has definitely been determined by agglutination. Altogether 1,435 specimens of fæces and a like number of urines were examined from the series of 463 patients. The latter have been divided into three groups as under, showing the number of examinations made on each group and the numbers in that group :—

Examined Once.	Examined Twice.	Examined Three or more Times.
47 cases or 10·15 p.c.	171 cases or 36·9 p.c.	245 cases or 52·9 p.c.

From this it will be seen that only a little over one half the total number were examined on three occasions at least. If, on these three occasions negative results happened to be obtained, the patient was considered clear from the clinical standpoint, and, as a rule, no opportunity was afforded for further examination. This is unfortunate, for no less than 9·4 per cent. of all the pathogenic dysentery cases were first discovered at the fourth or fifth examination.

If we consider, therefore, that 47 per cent. of the whole series were examined less than three times we must conclude that the incidence of carrier cases was in actual fact slightly larger than that which we give in this paper. This probable error, however, concerns rather the histolytica carriers as we shall show later, since 94·4 per cent. of those found to harbour pathogenic dysentery bacilli were discovered during the first three examinations. Where it is merely a question of determining the presence or absence of pathogenic bacilli in these cases, three examinations are, in our opinion, the least number that ought to be made, if the risk of missing carriers is to be reduced to a

minimum. Bearing this probable source of error in mind, together with the approximate time estimated as elapsing between onset of disease and date of first examination here, we find the following figures relating to carrier incidence.

Two hundred and fifty cases, or 53·9 per cent., showed no evidence of infection by pathogenic bacteria and were likewise devoid of protozoa. If, however, a greater number of examinations had been made, or if these examinations had been made nearer to the point of onset of illness, it is possible that this percentage would have been reduced. On the other hand, as most of these patients were sent in with a loose clinical diagnosis, some of them may never have been infected at all.

Those showing nothing, beyond the presence of cysts of the non-pathogenic protozoa, formed 22·46 per cent. of the whole, so that the total percentage which yielded no pathogenic bacteria or protozoa amounted to 76·36. The subjoined table shows how many cases were infected with each of the pathogenic or non-pathogenic agents.

19 cases or	3·88 per cent.	were infected with			B. Dys. Shiga.
51 ,,	11	,,	,,	,,	B. Dys. Flexner.
1 case	0·21	,,	was	,,	B. paratyphosus A.
3 cases	0·64	,,	were	,,	B. paratyphosus B.
47 ,,	10·15	,,	,,	,,	entamœba histolytica.
103 ,,	22·2	,,	,,	,,	entamœba coli.
72 ,,	15·5	,,	,,	,,	lamblia (Giardia).
4 ,,	0·8	,,	,,	,,	chilomastix.

In other words, 23·5 per cent. yielded definite proof of a pathogenic infection. 14·4 per cent. were cases of bacillary dysentery, while 10·15 per cent. were found to be histolytica carriers. All these cases, however, were not pure infections as will be seen from the following figures. Only 1·7 per cent. were infected with B. dysenteriæ Shiga, to the exclusion of other pathogenic bacteria and of protozoal infections. 6 per cent. were examples of pure Flexner infections, and 2·1 per cent. showed nothing but cysts of entamœba histolytica. The very small percentage of paratyphoid infections is noteworthy, even when we remember that the bulk of the cases were sent in as dysentery.

There is a remarkable fall in the percentage of Shiga carriers, as compared with that given for the series of 94 cases already mentioned as having been diagnosed abroad. This may partly be explained by the fact that, in the latter case, the men were examined much nearer to the source of infection. The further from that point the examinations are made, the smaller is the resulting percentage of carriers likely to be. There has also been a diminution of the number of Flexner carriers, although not to the same extent.

That the urine is an important possible source of infection, especially where B. dysenteriæ Shiga is concerned, seems indicated by the fact that in 9 out of the 19 Shiga cases bacillus was recovered from the urine —a percentage of 47·3.

In the case of Flexner infections, on the other hand, the specific bacillus was present only in 9·8 per cent. of the urines from 51 cases.

Bearing on the question of length of time during which a patient may remain a carrier, we find that only two cases, or 4·8 per cent.,

out of 39 from which Shiga's bacillus was recovered abroad, were still positive when examined in Reading.

Of the remainder, in which Shiga's bacillus was no longer demonstrable, 7 cases, or 17·9 per cent., now yielded B. dysenteriæ Flexner; 2 cases, or 5·1 per cent., were found to be discharging cysts of entamœba histolytica; and 1 case, or 2·5 per cent., yielded B. paratyphosus A.

Out of 38, received here as cases of Flexner infection, 5 cases, or 12·8 per cent., were still carriers of this organism, and, in addition, 2 of these 5 were now found to be infected with entamœba histolytica also.

Of the remainder which no longer showed a Flexner infection, 7 cases, or 18·4 per cent., were now found to be voiding cysts of entamœba histolytica, and 1 case, or 2·6 per cent., to be infected with Shiga's bacillus. It seems reasonable to suppose that these 18 cases out of a total of 77—a percentage of 23·3—were really instances of a double infection, and that either a sufficient number of examinations had not been made abroad or that, having found one pathogenic cause, the latter was tacitly accepted as the sole agent responsible for the patient's condition. This is an error into which one may easily be led, and to which it seems necessary to draw attention.

Finally, out of our series of 463 cases, 12 otherwise negative yielded organisms culturally indistinguishable from the paratyphoid group of organisms. These, however, failed to agglutinate in the presence of a paratyphosus A or B serum, and have been reckoned accordingly as negative, in the absence of knowledge as to their exact significance or pathogenicity, if any.

Examination of the fæces for protozoa, as already indicated, resolved itself principally, but not entirely, into a search for the encysted forms of the entamœba histolytica. The method employed in this search has already been fully described by one of us in a previous paper.[2] It involves the use of a double stain, which we have latterly used almost exclusively. The method in which iodine by itself is used to aid the eye in the detection of cysts and which is so much vaunted by some workers, is, in our opinion, after an extensive trial of both methods, much less reliable than the double stain process, especially in the hands of those comparatively unfamiliar with this sphere of protozoology. While retaining all the benefit due to iodine, the double stain method enhances the value of the latter, and by reason of the colour contrast renders the detection of cysts perfectly easy, with the result that the percentage of missed cases is likely to be reduced.

Fifteen patients arrived with a definite diagnosis of infection by entamœba histolytica comprising 15·95 per cent. of the 94 arriving here with a definite diagnosis. After arrival in Reading, 6 of these were found to be negative. Two of them, however, were only examined on two occasions, while the other 4 had the regulation three negative examinations.

These 6 patients were first examined here on an average 5 months

from the date of onset of illness, and 2 of them were known to have had emetine injections abroad. We cannot, however, agree, for various reasons, that they were actually free from histolytica infection at the time of their discharge from Reading. In one of them, entamœba histolytica had been found in France about 2 months previously, but he appeared to have had no treatment beyond one dose of 2 grains of emetine bismuthous iodide in Reading, given the day before the last specimen of fæces was sent for examination !

A second had had 10 injections of emetine in August, 1916, and 12 in October, 1916. In spite of this, entamœba histolytica or its encysted form was found abroad in January, 1917. No emetine was given in Reading, but he was fortunate (or unfortunate) enough to present three successive negative stools, and was accordingly discharged.

A third had had many injections of emetine (about 52 grains in all) in the East. Cysts were still present in the stools 19 days after the last dose had been given. Two examinations were made in Reading, and both were negative.

A fourth man had his first attack in the East in June, 1916. There was a relapse in October, and another in December of the same year, when he was given 12 grains of emetine by injection. On examination about 3 months later, entamœba histolytica was still present in the fæces, but after coming to Reading he happened to be negative on both occasions of examination, and was discharged.

A consideration of these 4 cases leads one to place very little reliance on the value of three successive negative reports, especially when we consider that, out of the number sent to Reading as cases of histolytica infection, 60 per cent. were still positive. Further, out of the series of 94 patients sent here with a definite laboratory diagnosis, 11 were found to be carriers of histolytica cysts, who had not been diagnosed previously as such. 11·7 per cent., therefore, of this series of 94 diagnosed cases were histolytica infections which had been missed entirely, probably because a bacillary infection had been discovered first, and had been accepted as the sole causal agent.

Assuming that the laboratory diagnosis was made abroad by competent men and under favourable conditions, the margin of error in this series of 94 cases appears to be 11·7 per cent. If to the number missed we add the number sent in as definite histolytica cases, we find that out of 94 men 27·65 per cent. had been infected with entamœba histolytica. This is certainly somewhat in excess of the supposed real incidence of such infections as suggested by Dobell.[3]

In our series of 463 cases, we found 47 carriers of histolytica cysts, which forms 10·15 per cent., as already mentioned. This figure is slightly below that given by Dobell, which he bases on the average of positive results got by various independent workers in the course of examination of over 2,000 men.

There appear to be three possible explanations. We may have been less able than those other workers to detect such cysts when present. As, however, in a large proportion of the cases we used the new double stain, and as frequently more than one preparation was examined from

the same sample of fæces, it seems unlikely that the error arising
from this source could be large. In this connection, it seems only
fair to ourselves to add, that every slide examined was made from
mixed samples taken from various parts of the stool, and no
negative report was made on the strength of a single negative
preparation. Another possible explanation is that a sufficient
number of examinations was not made. Reference to this has
already been made in a previous part of this paper, and we may
re-state that, given a greater number of examinations per case, a some-
what larger percentage of positives would have been obtained.

The actual numbers found positive here for the first time are placed
n the accompanying table, alongside the number of the examination
when such a diagnosis was arrived at :—

No.	First occasion when found positive.	Percentage of histolytica cases.
19	1st exam.	40·4 per cent.
12	2nd ,,	25·5 ,,
11	3rd ,,	23·3 ,,
3	4th ,,	6·3 ,,
2	5th ,,	4·2 ,,

In the case of histolytica infections, therefore, 10·5 per cent. of
such would have been missed, if only three examinations had been
made. Even with an increased number of examinations, however, we
should scarcely expect to find the high average percentage (18 to 25)
mentioned by Dobell for this reason, which we consider perhaps the
most important of the three. The majority of the patients in our series
came from France, if we are allowed to judge from the fact that out of
266 cases whose records were available, 73·3 per cent. came from
France, many never having been in the East at all. This being so,
it seems reasonable to suppose that the incidence of infection in France
would be considerably less than amongst the troops quartered in the
East, where the disease is endemic, and where the sanitary and climatic
conditions are presumably less satisfactory.

TREATMENT.

Out of the 47 cases found by us to be carriers of entamœba histolytica,
11 only, as mentioned, came with a correct diagnosis. Of these 11 cases
there was no record of specific treatment in more than 9, in which
treatment consisted of subcutaneous injection of emetine. In one
or two instances the total amount injected appears to have been
considerable, and yet they were still carriers. With one or two excep-
tions, who did not know whether they had been injected or not, the
remainder had apparently had no specific treatment till they came to
Reading. Here, for a time, the practice appears to have been to
give 2-grain doses of bismuth emetine iodide each night for seven
nights, as soon as a man was reported to be a carrier. This course
was adopted in all patients except 14, who never had any specific treat-
ment here, and left hospital presumably still carriers. Of these, 5
were known definitely still to be carriers, while the remaining 8 had
given one, two, or three negative results after having given at least

one positive one.

Fourteen others were given B.E.I. in 2-grain doses for seven nights as stated above. If cysts were still found present after one such course, the same treatment was repeated, and so on time after time. How valueless such a method of treatment is appears from the following table :—

No. of Courses.	No. of Negative Results.	No. of Positive Results.	No. of days from end of treatment when examined.
1	3	—	3, 18 and 29.
1	3	—	2, 15 and 24.
1	3	—	2, 8 and 25.
1	2	—	28 and 41.
1	1	—	20.
1	3	—	3, 12 and 25.
1	2	—	2 and 10.
2	2	—	2 and 14.
3	—	2	15 and 41.
3	2	—	10 and 24.
3	2	—	11 and 19.
4	—	2	9 and 21.
5	—	1	10.

Another case had only one dose of 3 grains of B.E.I. which was followed by two negative reports, one on the second day and the other on the eleventh day after this treatment.

Case 11 had, in addition to three separate courses each of 14 grains, two doses of 2 grains each, and three doses of 3 grains each before the two negative results recorded were obtained.

No one can claim for a moment that all these patients were cured because they happened to yield one, two, or three negative results after cessation of treatment. Point is lent to this statement when we con sider that Nos. 1 and 6 were chronic cases of many years' standing, and it would be absurd to claim that a course of 14 grains in all of B.E.I. should have cured them.

Of the remaining cases, 18 were treated with more adequate doses, after having first been treated unsuccessfully on the above lines. These may be divided into two groups. Half of them were given four tablets, each night for 12 nights, of an emetine adsorption product, devised by Dr. Dale and kindly supplied for trial by the Medical Research Committee.

The 48 tablets represented a total of 12 grains of emetine. The stools were examined on the first occasion at least seven days after the treatment had been completed, and then at intervals of a week or 10 days till three negative examinations had been made. Out of 9 so treated, 5 (55·5 per cent.) yielded three successive negative results, the examinations being made over a period of 27·6 days.

Four cases (44·4 per cent.) were still positive after one course of this treatment. Three of these were treated to a second course of 12 doses of the same preparation. One of the 3 was returned negative on the first examination, but was positive again on the second examina

tion. The second of the 3 was positive both on the first and second examinations, made on the eighth and fifteenth days respectively. The third has been negative on the two occasions examined, viz., on the eleventh and eighteenth days after cessation of treatment. At least 22·2 per cent. must therefore be regarded as failures after two courses of this particular drug.

The other 9 patients were given 3 grains of B.E.I. each night for 12 consecutive nights with two exceptions, to whom the B.E.I. was given in 1-grain doses three times a day for 12 days. The stools were examined as before mentioned.

Four cases out of the 9 gave three negative results after treatment ceased. A fifth was found to be negative when sent for his only examination, after the first course of treatment, on the thirty-sixth day. For some reason he was given a second course of 10 doses, and, again, the only examination made (on the fortieth day after stoppage of treatment) he was negative. The remaining 4 yielded positive results after one course of treatment. One was positive on the fourth day, and no other specimen was received for examination till after he had had a second course. Another was negative on the seventh day but positive again on the fifteenth, while the other two were positive on the fifteenth day.

The first of these was treated to a second 12-day course of B.E.I., after which three negative results were obtained.

The second was given emetine by subcutaneous injection, but the negative results obtained in this instance are unreliable, since the stools were sent for examination during the course of the treatment. The third and fourth were given, for their second course of treatment, the emetine adsorption product to which reference has already been made. One was still positive on the fifteenth day, and the other two each on the eighth and fourteenth days after the treatment came to an end. Four cases, therefore, out of 9, or 44·4 per cent., were negative on three occasions after 12 consecutive 3-grain doses of B.E.I., and probably a fifth, which would bring the percentage up to 55·5.

One yielded three negative results after having had two courses of B.E.I. Two were still positive after one course of B.E.I., and remained positive, even after a second course of treatment when adsorption product was substituted for B.E.I. The results obtained in a fourth case have been referred to as unreliable. A comparison, therefore, of two more or less parallel series of cases, one treated with an emetine adsorption product and the other with B.E.I., shows a close similarlity in the efficacy of the two drugs after one course of treatment.

Five cases (55·5 per cent.) treated with the former drug gave three negative results, while of those treated with B.E.I., 4 cases yielded three negative results. If we include a fifth case, which would probably have given the same number of negatives but which was only examined once after the first course of B.E.I., we again get a percentage of 55·5.

In each series at least 22·2 per cent. were still positive after two courses of treatment. Granted that those which were negative on

three occasions after cessation of treatment would have remained negative if further examinations had been made over a longer period of time, we find that only between 50 and 60 per cent. would be cured after one course of treatment equal in amount to 12 grains of emetine. There would conversely be about 30 per cent. of failures, which after a second similar course would have become reduced to about 20 per cent. This is somewhat above the percentage of failures to be expected after a 12-dose course, and seems to indicate that the minimum dose should be slightly greater than that hitherto recommended.

There are certain drawbacks, however, to the prolonged use of B.E.I., for it has the effect of producing nausea, vomiting, or diarrhœa in a considerable number of cases. Given that the emetine adsorption product is as efficacious as B.E.I., it would be preferable to employ it as a routine if it could be shown to be less disagreeable in use. At the same time, the increase in the minimum dosage above suggested could be made if the new product was more easily tolerated.

Of the series of 9 cases treated with the adsorption product only 1 was troubled with vomiting, which was easily controlled by the oral administration of tinct. opii. In 2 cases there was slight enfeeblement of the heart's action, and in 4 there was slight looseness of the bowels.

In the case of those treated with B.E.I. 4 were troubled with vomiting, one with diarrhœa, and one with colic.

Of those treated with the smaller doses of B.E.I. many were troubled with vomiting and diarrhœa, and one or two showed slight enfeeblement of pulse.

Perhaps the best testimony to the advantages accruing from the use of the adsorption product is the fact that the men themselves, who had had previous experience of B.E.I., asked to be put on the new product, when they saw how little discomfort was produced on their fellows who were so treated.

NOTE ON THE MICROSCOPICAL FINDINGS.

There appeared to be no uniformity in the presence of histolytica or other cysts in successive specimens of fæces, and no periodicity in their appearance. The same case yielded positive and negative results at various times in the most diverse fashion.

All sorts of combinations of cysts were encountered, and even these varied from one examination to another. For instance, one positive result might be followed by several negatives, which in turn might be succeeded by another positive. Further, when two types of protozoal cyst were present at the first examination, one or both might drop out for two or three examinations only to re-appear perhaps with a third type of cyst. This has a bearing on what has been said already as regards the frequency with which more than one infection is present, and points to the necessity of not resting content with the discovery of one pathogenic agent only.

As regards the microscopical appearance of cysts, there is little to add to what is already well known. The numbers varied from not infrequently only one on a slide to as many as 6 or 7,000, and in

any one case the numbers present varied from one examination to another without any apparent reason. They showed considerable variation in size, ranging from " minuta " forms of about 8 μ in diameter, occasionally even uninucleate, to large forms measuring 17 μ to 18 μ across. These atypical forms, however, were not encountered very often, and they alone called for some degree of discrimination.

CONCLUSIONS.

1. From a study of the type of case dealt with in this paper, it would appear that while 3 examinations of the excreta will probably detect about 95 per cent. of carriers amongst those convalescent from bacillary dysentery, at least 5 examinations ought to be made in cases of amœbic dysentery.

2. As this investigation has shown that a considerable proportion have a double or triple infection, we are of opinion that, at least, 5 examinations of the excreta should be the rule in the case of all suspected of having had dysentery.

3. It is important to bear in mind that the urine may be a possible source of infection.

4. In the search for protozoal cysts we recommend the double stain process in preference to the simple iodine method, in order to minimize the risk of missing positive cases, especially when the infection is a light one.

5. As regards treatment, while exact data concerning the amount of emetine given abroad subcutaneously are wanting, the results, judging from the cases which have reached us, appear to indicate comparative inefficacy of that form of administration.

6. Two preparations have been used here in treatment, viz., emetine bismuthous iodide and an emetine adsorption product. These appear to be of equal potency as regards rendering the stools negative, and superior to emetine given subcutaneously.

7. B.E.I., however, is handicapped by reason of its disturbing effect on the patient, and, in our opinion, is inferior in this respect to the emetine adsorption product which, for the most part, can easily be tolerated.

8. As our cases appear to show that not more than 50 to 60 per cent. may be regarded as possible cures after one course of 12 doses, we urge that the minimum course of 12 doses should be increased.

9. As the unfortunate concomitant effects of B.E.I. preclude its prolonged use, we recommend that the emetine adsorption product should be used in its place as a routine treatment.

10. Finally, as in our series of treated cases, those which yielded the regulation 3-negative results could no longer be followed up to enable us to give any opinion as to permanent cure, we wish to suggest, as a counsel of perfection, that such cases should be followed up officially, whether in civil life or in the army, and that periodical examinations of the excreta should be made over a certain determined period.

11. We make these suggestions because we consider that there will be found in the country, when the present army is disbanded, a reservoir of latent infection with a certain potential for initiating outbreaks of disease.

REFERENCES.

[1] *Lancet*, September 23, 1916.

[2] *Lancet*, April 14, 1917.

[3] Report to Med. Research Committee, Special Report Series, No. 4, 1917.

REVIEW OF RECENT WORK ON DISEASES OF THE HEART.

By C. W. CHAPMAN, M.D., M.R.C.P.

Consulting Physician to the National Hospital for Diseases of the Heart, etc.

FAILING COMPENSATION DURING PREGNANCY.

CHARLES H. LAWRENCE (*Boston Med. and Surg. Jour.*, December 14, 1916), in discussing this subject, discounts the value of statistics from lying-in clinics as a guide to private practice. Face to face with the question of advising an individual not to have children on account of her cardiac condition, or that pregnancy should be terminated before the period of viability for the same reason, statistics furnish a sound basis for general statements, but are disappointing as an aid to decision in any given case. In estimating the ability of any heart to meet the formidable demands of pregnancy, the margin of safety must be a wide one, and the computation of the cardiac compensation and reserve must be based on a thorough examination of the circulatory apparatus, and upon the understanding that the patient is closely watched during pregnancy and labour for signs of failing compensation.

The chief points in estimating the ability of the heart to meet the demand imposed upon it are : (1) The history of the effect of a previous strain; (2) Information as to the ability of the heart to respond to the demands of ordinary life, especially if the patient has had periods of poor health and disinclination for exercise; (3) If the change in the normal pulse-rate increases with the change from lying to standing, this reaction is abolished in early pregnancy, and its reappearance means cardiac insufficiency ; (4) The respirations which, if slightly impaired compensation is present, average higher than normal, and are more easily accelerated ; (5) The urinary output in relation to the fluid intake ; (6) If the cardiac condition warrants it, the effect of digitalis should be ascertained. If it is decided in the case of slight failure to empty the uterus, delay is hazardous, and when the patient has had a previous breakdown, the operation should be performed unless the patient, with full knowledge of the risk she runs, refuses. It is advised that patients who elect to run the risks of pregnancy should be spared as much strain as possible, and given an amount of digitalis sufficient to maintain efficient cardiac action during the entire period. The diet should be nutritious, and of a character least liable to cause distension. During labour venesection or, on the other hand, transfusion may be called for. For stimulation of the myocardium, digitipurin given intravenously has yielded the

best results.

SCLEROSIS OF THE PULMONARY ARTERY

BARLARO (*Revista de la Assn. Med. Argentina*) describes a case of what he calls Ayerza's disease in a woman of 44. The face was very cyanotic, pulse 80 regular, the right heart dilated. The red count was 6,680,000. She usually had three attacks of dyspnœa during the 24 hours, relieved by expectoration. This had been going on for three years. Occasionally there was blood in the sputum. She was inclined to be chilly and her feet were always cold. Barlaro gives a skiagram of the case, and discusses the various affections with which this clinical picture from sclerosis of the pulmonary artery is liable to be confused. Syphilis is probably responsible for the trouble in most cases; this was evident in the case described. Barlaro adds that probably some of the cases were of this type, which have been recorded as primary and chronic myelogenous polycythæmia (Vaquez' disease), especially in the form of enlargement of the spleen. This is particularly likely in the case of chronic bronchial catarrh, pulmonary emphysema or a persistent cough through two or more years with blood at times in the sputum.

DYSPNŒA IN CARDIO-RENAL DISEASE.

THOMAS F. COTTON (*Canad. Med. Assn. Jour.*, November, 1915) reviews the records and observations on a number of cardio-renal cases showing dyspnœa, made by Thomas Lewis and others in 1913, and from his own cases concludes that the dyspnœa with slight cyanosis, seen in elderly subjects of cardiac disease, is not due to an excess of CO_2 from deficient aeration of the blood, but to an acid intoxication. This dyspnœa is often of a Cheyne-Stokes type; hypertension is common, renal impairment is constant, and wasting with a subnormal temperature are to be noted. Pure cardiac dyspnœa is accompanied by excess of CO_2, which, by rendering the blood more acid, acts as a stimulant to the respiratory centre. Ordinary treatment, in conjunction with a salt-free diet and restricted fluids, is recommended.

BACK-PRESSURE AS A CAUSE AND CONSEQUENCE OF HEART-FAILURE.

HARRINGTON SAINSBURY (*Lancet*, December 8, 1917), confining his remarks to heart failure caused by valvular disease, contends that the accepted theory of back-pressure is the correct one, and is due to a reactive resistance interposed in the course of the circulation of the blood through the chambers of the heart. This resistance works by the development of a reactive pressure which, preventing the forward delivery of the blood, leads to an accumulation of blood behind the obstruction. The effect of this accumulated (residual) blood is first felt by the heart itself as a distending force, and ultimately in the furthest venules and capillaries. The author goes on to show that heart-failure in back-pressure is due to the impairment of the heart-muscle through

obstruction in the coronary veins.

This explanation of the relation of heart-failure to back-pressure has recently been called in question by some modern cardiologists. Dr. COLBECK (*Lancet*, December 20, 1917) states the case of the " old school " with much clearness. He asks the question : " Is the distension of the auricle that occurs in connection with mitral stenosis the exciting cause of the fibrillation of its walls ? " On clinical grounds this is considered to be the case, since auricular fibrillation occurs invariably at the late stages of valvular narrowment, when the intra-auricular pressure is greatly increased and the auricular distension considerable. The writer contends that success in treatment depends upon lessening the stretching of the auricular muscle. Rest in bed, administration of digitalis, free purgation, venesection, either severally or collectively, are frequently instrumental in abolishing the abnormal rhythm and restoring the presystolic murmur.

FUNCTIONAL DISORDERS OF THE HEART IN SOLDIERS.

Dr. MACILWAINE gave at the Ulster Medical Society (*Lancet*, February 16, 1918) an account of the clinical examination of 3,000 cardiac patients at an overseas hospital, two thirds of whom he found suffering from functional disorder. Physical examination failed to detect the presence of organic disease, while a routine examination of the nervous system showed lack of mental control, increase of the deep reflexes, and other evidence of a state of irritable weakness of the psychic and psycho-motor systems. In these cases, Dr. Macilwaine assumes a similar condition of irritable weakness in the involuntary nervous system, which betrays itself by the irritable heart syndrome in response to effort or emotion. Sympathetic over-action expresses itself in tachycardia and sweating, vagal preponderance in faintness. In cardiac neurasthenics, sympathetic over-action is in the ascendant, and often coincides with evidence of vagal insufficiency shown by an atonic state of the stomach and intestines.

PROGNOSIS IN IRRITABLE HEART OF SOLDIERS.

THOMAS LEWIS (*Lancet*, February 2, 1918) contrasts prognosis in the life-period of a civilian and that which pronounces an invalid soldier's subsequent fitness for duty. The latter he considers the easier. Between those soldiers whom it is inadvisable to return to duty and those likely to remain competent, comes the large middle group. With these latter, the author advises testing their powers of physical endurance by exercise tests of a shorter or longer duration as a means of grading soldiers generally, but of invalid soldiers in particular, to various categories of duty. It is strongly advocated that every general military hospital should have at its disposal a training ground, upon which its patients may be submitted to physical exercises under the supervision of the M.O.'s who treat and sort them. This system was introduced in 1916. The after-histories of 272 " D.A.H." cases, discharged to duty categories, are convincing of the success of

the method advocated.

Sir W. Ostler (*Ibid.*, February 9th) endorsed the value of the system, while Major Murray, C.A.M.C., in giving his support, related his experience at the Categoration Board in two Canadian hospitals. His grouping of cases is (1) by physical examination, (2) by graduated physical exercises. F. J. Poynton, in the following number, advocated a more careful supervision of the training of young recruits and of growing boys to avoid their being overtaxed. The salient point in these papers is the necessity for a comprehensive study of cardiac cases in contradistinction to a slavish dependence on instrumental findings, useful though they are in their place.

AUSCULTATORY BLOOD-PRESSURE DETERMINATION—A SOURCE OF POSSIBLE ERROR.

Jerome E. Cook and Taussig (*Jour. Amer. Med. Assn.*, April 14, 1917) call attention to the absence of the humming sound which follows the " second phase," and a possible error in diagnosis. In about 5 per cent. of cases, the humming sound of the second phase is very feeble, or may be replaced by a period of complete silence. The sharp tap of the third phase sets in rather suddenly and, as the pressure of the cuff continues to fall, the third and fourth phases follow the usual course. In those cases in which the second phase is marked by complete silence, the inflation is very likely to be stopped at this point, the pressure then being gradually lowered and the beginning of the third phase incorrectly noted as the systolic pressure. It is assumed that this phenomenon is the result of a high peripheral resistance. The error may amount to 50 mm. Hg.

SHOCK AND LOW BLOOD-PRESSURE.

W. T. Porter (*Boston Med. and Surg. Jour.*, December 14, 1916), from personal observation behind the fighting line, correlated with his experimental study of shock in animals, concludes that the phenomenon is associated with persistent lowering of the diastolic blood-pressure. The possibility of recovery from shock is dependent upon the restoration of this pressure to within normal limits. For this purpose, he advises posture (reclining?), warmth, intravenous infusion of normal saline and of adrenalin, and blood transfusion.

EFFECTS OF ALTITUDE AND DEPRESSION ON BLOOD-PRESSURE.

Harley Stamp (*Med. Record of Med. and Surg.*, March 24, 1917) contributes a record of many observations made by himself at Pike's Peak, Tennessee. The observations were taken in a coach or automobile in ascents, and in a cage in descents at elevations of 10,240 feet and 4,662 feet, a difference of over a mile. Nine of the persons were men, nine women, both of various ages, one was a boy aged 10. A natural effort to bring about the average heart-load was noticed. The " heart-load " was arrived at by dividing the pressure of the pulse by

the diastolic and in this percentage to estimate the normal, which has been put at 50 by various observers. The general tendency was for the heart-load and pulse-pressure to fall at the lower level, and to recover on coming to the surface. The observations are indicated by charts.

ALEXANDER FRANCIS (THE PRACTITIONER, August 1917) makes a further contribution on the reduction of blood-pressure by cauterization of the nasal septum. After referring to his observations of the beneficial effect of this treatment in asthma, confirming, as he thinks, Francis Hare's contention that asthma is a vasomotor neurosis, the author states that reduction of blood-pressure follows cauterization of the upper half of the nasal septum, and that this reduction is most pronounced when the treatment is applied to the higher parts of the septum; this, he believes, is due to action upon the sympathetic fibres running in the mucous membrane probably by inhibiting vaso-contractor action. The author has also obtained considerable relief by this treatment in cases of migraine and susceptibility to catarrh. The paper would be of more practical value, if an illustration had been given indicating the spots where the cautery should be applied for various neuroses.

THE PULSE-PRESSURE TEST IN PRE-OPERATIVE ESTIMATION OF THE RESERVE STRENGTH OF THE VASCULAR SYSTEM.

B. Z. CASHMAN (*Amer. Jour. of Med. Sciences*, October, 1917), in his opening remarks, states: " In many of the cases of so-called heart-failure, the trouble lies not with the heart itself but with the cardio-vascular system and its controlling agents, it is therefore necessary to consider the system as a whole in estimating its functional capacity." He relates a case of a patient, who underwent an abdominal operation and made an uneventful recovery up to the fourteenth day, when she died of syncope after sitting up in a chair for the first time. Beyond frequent attacks of palpitation for the last 18 months, irrespective of exertion, there had been no symptoms suggestive of circulatory trouble, no previous illness. On examination, the heart sounds were clear, no murmurs, heart not enlarged. Occasional extra systoles heard on auscultation. Urine negative. Blood-pressure not recorded.

In a second case, in which vaginal hysterectomy was performed and the patient made a good recovery, death occurred on the seventeenth day. In this case, the patient's only important illness had been enteric fever at twelve years. She was aged 46, and had had six children and one miscarriage. The cardiac dullness was extended upwards to the second interspace, and on the right to the mid-sternal line. The point of maximum impulse was neither seen nor felt. The sounds were clear. Systolic blood-pressure was only 110. Death was sudden.

The author relates cases of his own, with table indicating the pulse-rate, systolic and diastolic pressures, and pulse-pressure taken with the patient reclining, standing, after exercise, and again reclining. A fall in pulse-pressure, whether due to a fall in systolic pressure or a rise in diastolic pressure, or both, is considered as evidence of poor response

to mild strain on the part of the circulatory apparatus. The author considers that liability to tire easily, dizziness, dyspnœa on exertion, weak spells, slight swelling of ankles, although the heart appears to be normal by ordinary methods of examination as indications of lack of "reserve."

THE CLASSIFICATION OF THE CHRONIC HIGH BLOOD-PRESSURE CASES.

Louis M. Warfield (*Amer. Jour. Med. Sciences*, September, 1917) opens his paper by referring to the U.S. mortality statistics for 1915, in which it is shown that the number of deaths per 100,000 from arterial diseases of all kinds was 6·1 in 1900, and 23·3 in 1915. This increase he attributes largely to the stress and strain of modern life and over-indulgence in protein foods. The author deprecates the taking of systolic pressure only for the purpose of diagnosis and neglecting the diastolic and pulse pressures. The diastolic and pulse pressures measure the peripheral resistance, the work of the heart, the potential energy up to the moment of the opening of the aortic valve, and is the actual pressure in the aorta. The author tabulates his reasons regarding the importance of the diastolic pressure : (1) It measures peripheral resistance. (2) It is the measure of the tonus of the vasomotor system. (3) It is one of the points to determine pulse-pressure. (4) Pulse-pressure measures the actual driving force, the kinetic energy of the heart. (5) It enables us to judge of the volume of output, for pulse-pressure (PP) $\times$ pulse-rate (PR) = volume of output in most instances. (6) It is more stable than the systolic pressure, subject to fewer, more or less, unknown influences. (7) It is increased by exercise. (8) It is increased by conditions which increase peripheral resistance. (9) The gradual increase of diastolic pressure means harder work for the heart in carrying on the circulation. (10) Increased diastolic is always accompanied by increased pulse-pressure and increased size of the left ventricle, temporarily or permanently. (11) Decreased diastolic pressure goes hand in hand with vasomotor relaxation, as in fevers. (12) Low diastolic pressure is frequently pathognomonic of aortic insufficiency. (13) When the systolic and diastolic pressures approach, heart-failure is imminent when the picture pressure is either high or low.

HYPERTENSION.

W. Bentham Snow (*N.Y. Med. Jour.*, June, 1917), in considering the records of deaths from arteriosclerosis, which show that this disease often wrecks at a time of life when there should be many years of useful and happy existence still to come, emphasizes the importance of discovering rational modes of treatment to prevent and relieve this condition. He considers intoxication to be the most frequent cause of arteriosclerosis, and he advises extreme moderation or abstention from proteins, including white meats. In diagnosis, he relies more on the manometer than on percussion in the determination of ventricular enlargement, though most clinicians would avail themselves of both. Dr. Snow indicates his confidence in the mano-

meter by dogmatically stating that "any degree of pressure *at any age* (the italics are those of the present writer) above 120 Hg. with a full pulse or a high diastolic pressure indicates the presence of toxic processes; and that an error made by many clinicians is to assume that different pressures are normal for different ages." The present writer has yet to learn that belief in such a standard is at all common. As the paper was read before the American Electro-Therapeutical Society, electrical treatment is advocated. An interesting complication of hypertension referred to is dilatation of the splanchnic area as a cause of splanchnic neurasthenia, for the treatment of which mechanical vibration between the 3rd, 4th, and 5th dorsal vertebræ for five minutes is recommended, followed by the static wave current with a metal electrode placed over the lower margin of the liver at the epigastrium.

UNUSUAL MALFORMATION OF THE HEART.

ROBERTSON (*Jour. of Pathol. and Bacteriology, Camb.*, December, 1916) thus describes the conditions present in a boy of 13½ years of age. The heart was situated in the left thorax, the afferent vessels were normal, the atria were transposed, the ventricles were transposed, while the efferent vessels were straight and transposed. The course of the aorta beyond the heart was normal, for it crossed the left bronchus and descended along the left side of the spinal column. It was, therefore, a case of dextrocardia of the atrial and ventricular chambers, with transposition of the efferent vessels.

TWO CASES OF TRAUMATIC RUPTURE OF THE HEART.

G. R. TURNER and L. PEARCE GOULD (*Lancet*, October 13, 1917) report the case of a boatswain who fell 20 feet on to a buoy and was picked up in an unconscious state and taken to the R.N. Hospital at Plymouth. Beyond small lacerated wounds of the chin and tongue, no signs of external injury were found. He was in a state of cerebral irritation, the pupils did not react to light. The extremities were cold, pulse impalpable, and heart sounds feeble. After temporary improvement, stertorous breathing supervened, and death took place in three minutes. At the post-mortem no external bruising was found, and the contents showed no signs of gross injury. There was an oblique fracture of the first segment of the gladiolus, the anterior periosteum was not torn and there was no superficial ecchymosis, but the periosteum of the deeper surface was torn evidently by the jagged edge of the fracture. The left edge of the fracture had made a tear in the anterior wall of right ventricle close to the semilunar valve into the cavity of the ventricle.

J. B. O'GRADY (*Lancet*, November 17, 1917) reports a case of a man knocked down by a taxi. Here there were several abrasions on the front of the chest, but no wounds. On the left side the third, fourth, fifth, and sixth ribs were fractured about 5 inches from the sternum. The pericardium was torn at the apex, and was filled with blood. There was a tear at the apex of the left ventricle, perforating the entire thick-

ness of the heart-wall, and caused by the broken end of one of the fractured ribs.

LATENT WEAKNESS OF THE HEART CAUSING OBSCURE CONGESTIVE DISORDERS.

M. B. LEVITON (*Med. Recd. of Med. and Surg.*, March 24, 1917) records cases in illustration of his contention that in many instances, in which there are symptoms of pulmonary and digestive disorders due to congestion, the disturbance in function can be traced to cardiac weakness, as shown by a low blood-pressure and dilatation of the heart. There was absence of murmurs in all the cases. The present writer can confirm in many respects the author's observations and conclusions, for he has seen numerous cases in which the treatment of pulmonary congestion and indigestion had been barren of result, until the hitherto unnoticed cardiac inefficiency had been corrected.

NERVOUS HEART AND CARDIAC NEUROSIS

GERGET (*Münch. mediz. Wochensc.*, January 2, 1917) looks upon all diagnoses of cardiac neurosis as essentially negative. In cardiac neurosis, the subjective predominates over the objective—oppression, pain, anxiety, and palpitation. A nervous subject has an oversensitive nervous system, which responds to the slightest stimulus. Temperament must always be reckoned with.

SYPHILIS AND HEART DISEASE.

GAUCHER, Acad. de Méd., Paris (*Lancet*, December 22, 1917), states that syphilis is responsible for the greater part of diseases of the heart, and he considers that lesions of the aortic orifice are frequently syphilitic. He urges that patients with aortic disease who have only vague rheumatic antecedents should be examined for slight signs of tabes, particularly for the loss of knee jerks. The co-existence of definite tabes with cardiac lesions is not, the Professor states, very rare. That subjects of aortic disease who are liable to sudden death, not merely those with decided lesions but those who show only a little dilatation of the aorta with an accentuated second sound, are of syphilitic origin. Even a certain number of cases of hemiplegia, attributed to syphilitic arteritis of the cerebral vessels, were due to emboli originating in an aortic lesion. The Professor enumerates coronary arteritis causing aneurysm, rupture of the heart as the result of gumma, lesions of the bundle of His, and the permanently slow pulse as being syphilitic in origin. Lesions of the mitral valve are at times due to the same cause. The practical point in the recognition of the syphilitic factor in many cases of cardiac and aortic disease is the benefit derivable from anti-syphilitic treatment, if too much valuable time has not been lost. Finally, the writer claims that congenital syphilis plays a part in causation of heart disease.

SUDDEN DEATH.

BERNARD SPILSBURY (THE PRACTITIONER, February, 1917), in an interesting paper which will repay careful reading, gives the result

of his extensive pathological experience on this subject. The author found coronary disease to be the most frequent cause of sudden death; out of 50 such cases a large majority had retired to rest in apparently good health. Hæmorrhage into the pericardium was a fairly common cause. Among other causes connected with the circulation were ruptured aneurysms, senile disease of the coronary vessels, exophthalmic goitre, owing to secondary disease of the heart muscle, valvular disease, pulmonary embolism after confinement or operation, air-embolism, and congenital heart diesase.

ACUTE PERICARDITIS.

W. H. ROBEY, Junr. (*Amer. Jour. Med. Sci.*, August, 1917), in a paper based upon a study of 80 cases and the literature of the subject, particularly that of the last five years, seeks to emphasize certain physical signs which appear to him to be important. Pain is not necessarily present, but rather a sense of oppression in the chest or simply discomfort there. The skin over the pericardium is sometimes tender, due to connection between the upper intercostal nerves and the ganglia and nerves of the cardiac plexus. The author's conclusions are : (1) Acute pericarditis is a secondary affection (several other lesions have been found in every case of the 78 autopsies). (2) The extension from adjacent structures is uncommon, most cases occurring from infection of the sac through the blood-stream. (3) Præcordial pain is not so common as is supposed. In acute cases, pain and arrythmia may be noticeable at first, later the signs are those of cardiac and circulatory embarrassment. Pain is much more common in pleuritis, but plays such a factor in pericarditis that it is difficult to separate the two. (4) Rheumatic pericarditis should always be thought of, especially in young adults; pneumococcal peri- or endocarditis in young and middle aged adults, when failure of compensation is present before the crisis or after it, when there is fever or delayed convalescence. (5) Prognosis in acute pericarditis following arthritis is generally favourable to life, pneumococcal form is grave at any stage. (6) In mild cases local application will often suffice.

OPEN-AIR TREATMENT FOR THE CARDIAC CHILD.

HERBERT B. WILCOX (*Med. Record of Med. and Surg.*, March 24, 1917) remarked that only 6 per cent. of the institutions in New York City and district offered fresh air for children sick with serious acute or chronic conditions. The writer urged the necessity for prolonged stay in an institution where fresh air, sunlight, and good food were abundant after all the good possible had been obtained by hospital treatment. When children have so far improved in general health and cardiac efficiency, that symptoms no longer obtrude themselves, and they are promptly sent home where there is no supervision, they quickly relapse. If, on the other hand, " open-air treatment " is supplemented, the improvement would be rendered more or less permanent. This was shown by the figures given; thus, out of 77 cases cared for, all of whom had decompensation of various degrees, 49 per

cent. were discharged without any surface evidence of disease and able to follow nearly a normal life. The average stay in the home was 48 days.

TRAUMATIC PERICARDITIS DUE TO A NEEDLE.

ARTHUR B. HALL and J. B. F. WILSON (*Lancet*, December 8, 1917) relate an interesting case of this rare injury. A girl of 12 years picked up a rusty sewing needle on August 16, and pinned in the front of her blouse. She thought she had pressed it into her chest when leaning against a wall. On the following day she had dyspnœa but no pain, and on the 21st she was brought to the Sheffield Hospital. The cardiac dullness was much increased; it extended $1\frac{1}{2}$ inches to the right of the sternum and as far as the axillary line to the left, and upwards to the first intercostal space. The impulse could not be felt; cardiac sounds very faint. There was a loud double friction sound over the sternum. A lateral radiogram showed the needle pointing almost horizontally backwards. At the operation the needle was pushed forwards by means of a blunt instrument. The child made a good recovery.

THE PREVENTION AND RETARDATION OF CARDIO-VASCULAR DISEASE.

C. LYMAN GREENE (*New York Med. Jour.*, January 27, 1917), in his opening remarks on this subject, refers to the hopelessness which prevailed 50 years since with respect to pulmonary tuberculosis, which, he writes, was similar to the pessimism which obtains in some lay and medical minds regarding heart disease at the present time. But since both conditions represent infection, they are measurably preventable. The author summarizes the advance in the last few years thus: (1) Definite proof of the bacterial origin of acute rheumatism and syphilis, the two diseases chiefly responsible respectively for the juvenile and for the elder groups of cardio-vascular diseases. (2) The nature and extreme value of the subjective symptoms of cardio-vascular insufficiency. (3) The establishment of maximum dimensions for the heart for the individual. (4) The development of better and more accurate methods of percussion. (5) The application of the Röntgen ray. (6) The fact that therapeutic doses of digitalis do not affect the normal heart, the fully compensating diseased heart, or such subjective symptoms as are unrelated to cardiac inadequacy. Under the head of *Prevention*, we are reminded of the bacterial origin of rheumatic fever, the special strain of streptococcus being almost constantly present in diseased tonsils and many other septic foci. The author emphasizes the importance of following acute prostrating infections, especially that of rheumatic fever, for some time in order that lesions which manifest themselves later on may not be overlooked. The significance of the less obvious signs of cardiac involvement is pointed out.

HEART RESERVE IN MILITARY TRAINING.

By ALFRED JOHNSON, M.D.

Civil Medical Officer, Perch Rock Battery, and Liscard Gun Station.

In the medical examination of recruits for the army to designate their category, and later in noting their general fitness or otherwise as a result of training, the condition of the heart often proves to be the final index of the man's capabilities for military service. Defects such as impaired functions of the limbs, hernia, chest, kidney, and nervous troubles, etc., are usually estimated at their true value, because of the comparative ease of accurately investigating their condition of activity. With the heart I venture to think that the true estimate of its real value for military service is rarely arrived at.

It is not wished in any way to minimize the importance of careful observation by inspection, palpation, percussion, and auscultation of the organ, noting the condition of the blood vessels, and from these data forming an estimate of the condition of the heart. What it is wished to emphasize is, that the estimate found by these methods applied in a room, when the patient is practically at rest, is often a source of serious error in predicting the man's capacity for military training.

Too much importance seems to be attached to the presence or absence of valvular trouble, or murmurs, and too little to what the actual capabilities of the heart may be, and the amount of reserve that it can draw upon for military training.

The present methods of army examination, unfortunately, often place men in a category in which they prove quite unable to stand the strain of training and the duties of that category, on account of insufficient heart reserve, and they are passed from hospital to duty and duty to hospital until they are finally discharged from the army. This involves a useless expenditure, which might be better employed under these conditions.

These men with insufficient heart reserve might be much better employed in civil life, where experience has taught them the limitations of their strength. If, however, heart reserve was taken into account in the process of training, and this reserve never overdrawn upon, very many of these men might be turned into effective soldiers instead of being broken down by an arbitrary system of hardening.

Again, if the gauge of heart reserve held the important position it deserves, many men with ample heart reserve might be placed in a higher category than the one they occupy, with the certain knowledge that they would be able to stand the strain of the training of that category.

What is required is some fairly reliable method of checking the findings of examination of the heart under restful conditions, by

ascertaining its capabilities under strain and load. The heart is the most nearly mechanical of the vital organs. It is obvious that it would not be a reliable test to judge the capabilities of a motor engine when it was just ticking over with a minimum load : it must be tested under varying conditions of load and strain to find a correct estimate of its capabilities. So with the heart : the measurement of the soldier's heart reserve under varying conditions of load and strain would do much to make our army more effective. Over-training is more disastrous than under-training. The amount of training that can be undertaken with progressive benefit depends on the state of the myocardium. It must be a correct balance between the *vis a tergo* and *vis a frontis.*

In carrying out a scheme for finding the limitations of heart reserve, standard and varying physical strains would be necessary for the test. Marching progressive distances, parades, physical exercise to pick out the weaklings and, for those who showed ability for severe strains, doubling on the level and uphill.

An old but reliable test might be applied : that of taking the pulse-rate before the test, allowing three minutes to elapse, or for the more severe strains five minutes after the test, and then timing the pulse-rate again. If, after comparing the results, it is found that the pulse-rate is accelerated, this man is doing too much ; repetition will only lead to further dilatation of his heart, and he should be put to training involving less strain.

The test for any but those who have managed the severest tests should be applied at intervals of from one week to one month, according to the requirements of the case. Thus, each man would be trained according to his capabilities, and there would be no opportunity of deceit or fraud on the part of the man under observation.

A method such as this would not throw much extra work on the medical department, but would rather turn their energies from dealing with men broken with bad training to the prevention of crowding the hospitals and the everlasting " Attend B." (or no duty). Medical orderlies could easily be instructed in timing the pulse accurately, and referring those who failed in physical test to the medical officer.

In connection with heart reserve, the differential stethoscope, as described by Dr. O. Leyton in his able article in the March number of THE PRACTITIONER, is of the utmost value in determining the amount of heart reserve where there are no adventitious heart-sounds or valvular trouble. This stethoscope enables the examiner to measure the sound values, and indicates a want of heart reserve when the first sound at the apex is approximately less than double the second sound at the base. In this way the ratio between driving force and resistance and the condition of the myocardium may be gauged.

In conclusion, my suggestion is only the outcome of an earnest desire to rid the army of useless material before it comes before the Pensions Committee for assessment, and to pick out with confidence those men who may be trained with care and patience to their full athletic capabilities.

REVIEW OF RECENT WORK ON URINARY SURGERY.

By J. W. THOMSON WALKER, M.B., F.R.C.S.

Surgeon to King George's Hospital, Hampstead General Hospital, etc.

MISURACA[1] publishes the results of an experimental research into the lesions caused by suturing the renal parenchyma. The alterations observed in the kidney itself were almost inappreciable, macroscopically. Permanent changes were found around suture points in the parenchyma, resulting in a gradual disappearance of specific glandular elements, and their replacement by scar tissue. In the renal parenchyma involved by the restricting thread, there are circulatory disturbances and a zone of parenchymatous nephritis. These changes gradually disappear, leaving only slight traces. He concludes that suturing through the renal parenchyma, far from causing the grave alterations described by certain observers, is generally exempt from important complications, and does not compromise the general functional power of the organ.

Eisendrath and Schultz[2] publish a report on a study of the route of infection which takes place in an ascending direction along the interstitial lymphatics of the ureter. The organisms employed for experiment were the bacillus coli, staphylococcus aureus, and bacillus proteus. An emulsion of the organisms was injected into the bladder of a female animal, under aseptic precautions, and without producing injury. The following conclusions are drawn : Infection of the bladder, or lower ureter, may reach the renal pelvis of the kidney, either by way of the lumen of the urinary tract, or by way of the normal lymphatics. Experiments and clinical evidence indicate that almost complete obstruction to the free passage of urine is necessary for ascent of infection by way of the lumen of the urinary tract. Experimentally, the authors claim to have shown that infection set up by the simple introduction of bacteria into the bladder, without injury or obstruction, may pass upward by means of the interstitial lymphatics of the ureter. The experimental evidence indicates that, in cases of pyelitis and pyelonephritis in the human body, secondary to infection of the bladder, the lymphatics constitute the most important cause of the upward travel of infection, especially in those cases in which there is no hindrance to the urinary outflow.

Smith[3] reviews the subject of pyelitis of infancy. In uncomplicated cases the pelvis alone is involved, the lesion being a low-grade inflammation. Many cases show, in addition, degenerative changes in the renal substance, due to extension of the process from the pelvis. In regard to the mode of infection, Smith holds that the theory of ascending infection, so far as it applies to the pyelitis of infancy, has

not been proved, and the facts are against it. The intestinal tract is the source of infection in the majority of cases, the bacteria reaching the kidney by way of the blood-stream or the lymphatics.

Crabtree and Cabot[4] studied the evidence of production immunity in colon-bacillus pyelonephritis as follows : The normal adult harbouring colon bacilli in his intestine, and subject to occasional wound infection in which this organism may be concerned, is generally recognized to carry about protective antibodies for the common varieties of this organism. Cases of so-called idiopathic colon pyelonephritis, in which no abnormality of kidney or lower urinary tract could be demonstrated, occurred in patients whose normal resistance had been lowered from overwork, underfeeding, recent or chronic illness, recent pregnancy, or acute intestinal disturbances. They also hold that prostatics, operated on within three or four weeks after a pyelonephritis, are better operative risks, owing in great measure to acquired immunity. It is extremely unlikely that immunity conferred by recent infection, while largely responsible for the course of the disease, is at all lasting. It is recognized that vaccine treatment of these cases, while beneficial to symptoms, is, as a rule, not curative of the condition. The prostatic with uninfected urine who undergoes some form of drainage preliminary to operation, either with inlying catheter, suprapubic puncture, or the two-stage operation, almost without exception shows some rise of temperature during the periods of drainage, often presenting symptoms of acute pyelonephritis. The chief element of danger is renal infection, and the authors have tried to eliminate this by administering mixed colon vaccines during the periods of preliminary preparation. The administration of vaccines in prostatics should be made to extend over the period of convalescence.

In an article on the removal of stones from the kidney, W. J. Mayo[5] states that 450 patients were operated on for stone in a period of eighteen years at the Mayo clinic. The mortality was 0·6 per cent. In 48 patients (9·9 per cent.) stones were found in both kidneys, and in these cases the stone was removed first from the kidney least involved. In half the bilateral cases the second kidney was pyonephritic and nephrectomy was necessary. In three instances stones were found in a single kidney, and in two cases stone was known to recur in the solitary kidney after nephrectomy. Multiple stones in the parenchyma of the kidney are prone to recur. One of the most common causes of recurrence of stone has been due to attempts to conserve a badly damaged kidney which was of little use functionally. Another cause of recurrence is leaving fragments behind in attempts to remove the stone through too small an incision. A third cause is leaving stones not shown by the X-rays, their indistinguishability being due to their shadow being superimposed on that of the other calculus. The percentage of recurrence of stone after operation is under 10 per cent. In 206 cases, the stone was removed by incision in the pelvis. The incision is closed with catgut and covered with fatty tissue. Drainage of the pelvis is rarely required for uncomplicated stones. If necessary, it should be done, not through the pelvis, but by counter-puncture

through one of the calices, preferably the posterior inferior calix. In 34 cases, combined pelviolithotomy and nephrolithotomy was performed. This was used when communication between the calix and pelvis was so small as to cause fragmentation in attempts at removal, or when much cortical infection was present. Each cavity should be drained separately, and at least one tube should lead to the renal pelvis. Nephrolithotomy was performed in 40 cases, but was seldom required for uncomplicated stones in the pelvis and calices. In 4 cases secondary hæmorrhage was so severe that nephrectomy was required. In 204 cases nephrectomy was performed. In most cases pyonephrosis and stone were present. Stone did not form in the remaining kidney in any of these cases, and there was no sign of renal insufficiency. Subcapsular nephrectomy is frequently required.

In an article on the use of thorium in pyelography, Burns[6] states that it is non-toxic, non-irritating, opaque, with a good shadow and sharp definition, has a decided degree of fluidity, and is inexpensive. The best combination contained a double citrate of thorium and sodium, with an excess of sodium citrate and some sodium nitrate. The solution used contained 10 or 15 per cent. of thorium, the 10 per cent. solution being used for cystograms, and the 15 per cent. for uretero-pyelograms. Solutions of thorium nitrate and thorium chloride alone cannot be used clinically, on account of their irritant action, and also from the fact that they precipitate insoluble salts when in contact with the urine.

Kretschmer,[7] in a valuable article, describes his observations on the use of cystography. This consists in filling the bladder with a fluid opaque to the X-rays, and obtaining a shadowgraph. The fluids found suitable were a 20 per cent. solution of cargentos and a 10 per cent. solution of thorium nitrate, the latter being preferred owing to cargentos causing staining. This method has been used to settle the dispute as to the part played by the true vesical sphincter in closing the bladder outlet, and has led to the unanimous opinion that the internal sphincter causes closure, and that no funnel or neck of the bladder is formed by the posterior urethra. Kretschmer's observations support this view, and he found that it held good in children and adults. Regurgitation of fluid into the ureter was demonstrated in a number of children and adults. Normally, the uretero-vesical junction or valve is supposed to prevent a reflux of fluid from the bladder up the ureter and into the kidney. Failure of this mechanism is of serious moment, especially in cases in which the bladder is the seat of infection, for infection may be transmitted directly upward to the higher urinary tract. In children, there was regurgitation of fluid four times in eleven cases, and in three of the four the urinary tract was normal. In one adult showing regurgitation the bladder was normal, and the ureteric orifices normal on cystoscopic examination. In five adult cases with regurgitation there were associated lesions of the urinary tract. Cystoscopic examination does not always give information as to whether the ureter is dilated or not, and in some of the cases examined the ureteric orifices

appeared normal, while cystography demonstrated the uretero-vesical valve was inefficient, and the ureter dilated. Diverticula can be recognized by the cystoscope, but their extent cannot be estimated. Cystography is the best method by which the extent of a diverticulum may be demonstrated. In benign hypertrophy of the prostate, the cystograph generally shows a raising or widening of the base, and the enlarged gland seems to elevate the bladder so that it is carried away from the symphysis. In malignant degeneration of papilloma a lack of distension may be demonstrated, and in malignant growths there is a defect of distension, variation in density, and diminished capacity.

Diverticula of the bladder forms the subject of an article by Thomas.[8] Diverticula round the orifices of the ureters are probably anomalies of mesonephric duct buds which normally form the ureters. The failure of the urachus to close may account for some of the sacs at the top of the bladder. The part that obstruction plays in the formation of these anomalies is not clear, but clinically, in a large percentage of cases, it seems necessary for the development of symptoms. Thomas divides diverticula into two groups, congenital and acquired. The congenital are hour-glass bladder, and double, split, or bifid bladder. The acquired type may be divided into (1) intrauterine, (2) obstructive, and (3) traumatic. From January, 1908, to November, 1915, 27 cases of diverticulum of the bladder were observed at the Mayo clinic; 14 of these patients were operated on, 7 were not, and 6 cases were found at autopsy. The average age was fifty-one years, the youngest was eighteen years, and the oldest seventy-three. Of the urinary symptoms there was difficulty of micturition in 70 per cent., and in 9 cases it amounted to retention of urine. Frequency of micturition was the predominant symptom in 22 cases, and hæmaturia was present at some time in 8. In only 2 cases had the symptoms begun in childhood. A suprapubic tumour was palpable in 3 cases. There was loss of weight in 11 cases. In 84 per cent. there was a pronounced degree of cystitis. In 3 cases there was cancer in the bladder, and in 1 there was cancer in the diverticulum. Stones were found in the bladder in 4 cases, and in the diverticulum in 3. Urethral stricture was present in 3 cases, and in 8 the prostate was enlarged. The opening of the diverticulum was found near the ureteric orifices in 6 of the 27 cases. In 6 others the opening was on the floor of the bladder; in 2, near the urethra; in 4, on the posterior wall; in 2, in the dome; in 3, the lateral wall was involved, and in 1 an hour-glass condition was found. In 14 cases an operation was performed. The diverticulum was resected in 6, extraperitoneally in 4, and intraperitoneally in 2. In 6 cases a drainage operation only was done, or the diverticulum opening was enlarged. In the 6 cases of resection there were no deaths, but one patient died some weeks after leaving hospital probably from acute renal infection.

Lowsley,[9] after discussing certain obstructions at the vesical orifice, concludes that:—obstructive tumours at the vesical orifice, exclusive of adenomatous hypertrophy of the prostate proper, are due in 77 per cent. of cases to an hypertrophy of the subcervical group of tubules; in 12 per cent. to an hypertrophic change of the musculature

of the trigone at the vesical orifice. In 4·5 per cent. tumours arising from the subtrigonal group are present, 3·5 per cent. of the cases show a fibrous stricture of the vesical orifice, and 2·5 per cent. have cystic conditions which cause obstruction. The prostate proper is only atrophied when the obstructive mass is due to a fibrosis of the vesical orifice. The subcervical tubules are also atrophied in such a case. Treatment should consist of dilatation with sounds, massage, and instillations, in cases of slight degree. In cases with considerable residual urine the operation of choice is Young's pouch operation. Chetwood's galvanocautery and the high-frequency current may be used in certain selected cases. Suprapubic cystotomy is never necessary.

Randal[10] made a study of 300 autopsies in the adult male, ranging from eighteen to eighty-three years of age, with a view to demonstrating the gross pathological characteristics of median bar formation. There were 54 (18 per cent.) cases of median bar formation. Of these, 18 were large bars, which, without doubt, caused urinary obstruction and retention during life. These represent 6 per cent. of the 300 cases. In the remaining 36 cases (12 per cent.) the bar formation was small, and was not associated with changes that would indicate undoubted urinary obstruction. From this study the author concludes : (1) age is not a determining factor as to the type of bladder obstruction; (2) the fibrous types of median bars are due to chronic inflammation which is part of a chronic prostatitis; (3) a glandular type exists entirely apart from general prostatic hypertrophy.

Thomson Walker[11] describes his observations on the bladder in gunshot injuries of the spinal cord, based on over 450 cases. The condition of the urinary tract is the most important clinical factor in these cases of spinal injury. Urinary infection may be a contraindication to operation on the spine, or it may cause death after an operation. It may be fatal when operation has already given promising results, or when, without operation, the case is showing signs of improvement in the nerve lesion. A sequence of two distinct stages were observed in these cases. (1) A stage of complete retention beginning at the time of injury, during which the bladder is distended with urine. After a time the urine begins to dribble away, the bladder remaining distended (retention with overflow). The duration of this stage was on an average fifty-five days. (2) A second stage of periodic reflex micturition, or active incontinence, succeeds the first stage, and unless improvement in the spinal lesion takes place this is the permanent state of the bladder. There is a transition stage between the first and second stages, during which the bladder is still distended, or partly distended, with urine, but active contraction of the bladder wall takes place. The bladder gradually becomes more contracted until the quantity of urine left after micturition is very small or there is none at all. In the fully developed second stage the bladder is purely a reflex organ.

This sequence of complete retention followed by active incontinence, with an intermediate stage, was observed in all lesions of the cervical, dorsal, and also of the lumbar region of the cord, and occurred

even when the lumbar enlargement was destroyed.   It developed in more than half the cases of lesion of the cauda equina.   Urinary infection is the most common and most fatal complication in gunshot wounds of the spine, and was the cause of death in practically all fatal cases.   The infection was due to the catheter, and occurred in the first few days after the injury.   Ascending septic pyelonephritis was the fatal complication in all cases, and was due to intermittent catheterization, permitting the repeated distension of the bladder with infected urine.

The treatment of the urinary tract consisted in provision for the removal of the urine and treatment of septic complications.   Intermittent catheterization was the method universally adopted for removing the urine   The tied-in catheter had been used in some cases, but was unsuitable, because it caused sloughing of the urethra and fistula.   The author strongly insisted that suprapubic cystotomy should be done in all cases before any catheter was passed, and therefore before the bladder had been infected and ascending pyelonephritis resulted (prophylactic cystotomy).   The object of the suprapubic cystotomy was to give free drainage of the bladder, and prevent intravesical tension forcing infected urine up the ureters and causing septic pyelonephritis.   To be effective it must be carried out before any catheter has been passed.   When cystitis was already present, suprapubic cystotomy should still be performed in order to treat the cystitis and to prevent recurrent ascending infection.

An important article by Pedersen[12] on syphilis of the bladder reviews the literature and describes two undoubted and two probable cases of this condition.   The forms under which secondary syphilis of the bladder appears are very similar to, and often practically identical with, the non-specific lesions known as simple hyperæmia, simple ulcer, and papillary growths.   The hyperæmia is said to appear as discrete reddish spots, like macules, and may be symptomless.   The characteristic ulcer is like the specific ulcer on any mucous membrane, situated in an area of œdematous infected mucous membrane, with a grey base and definite prominent firm edges.   The ulcers are usually multiple in clusters, rarely disseminated, and often grouped about or adjacent to one or both ureter mouths.   They may readily be mistaken for tuberculous ulcers, especially when symptoms of cystitis are present.   The papillary growths of secondary syphilis have no features recognizable by cystoscopy that will differentiate them from ordinary papillomata or from the villous growth surmounting a malignant base.   The gumma of the bladder is equally difficult of diagnosis by inspection, and resembles an infiltrating malignant growth.   By cystoscopy alone, therefore, the diagnosis of syphilis of the bladder cannot be made. It must be supported by one, at least, of the following : history of syphilis, Wassermann's reaction, syphilitic signs elsewhere, or the treatment test.   The author concludes that syphilis of the bladder is often overlooked or non-recognized.   If it is diagnosed and treated, the prognosis is good.

In discussing the surgical treatment of vesical neoplasms, Beer[13]

states that all benign cases suitable for cystoscopic high-frequency cauterization can definitely be cured by this method.   The following types of case are unsuitable for this method of treatment: (1) patients who are intolerant; (2) patients who bleed furiously on every application; (3) patients whose tumours are inaccessible; (4) patients suffering from papillomata of the bladder.   These cases, and also all those of extensive benign recurrence, should be treated by suprapubic cystotomy and removal by the cautery.   A partial cystectomy by means of the cautery is recommended in cases of papilloma which appear clinically benign, but do not respond promptly to endovesical high-frequency cauterization.   When the growth appears malignant cystoscopically, partial cystectomy or total cystectomy should be performed at once.

Geraghty[14] reviews the treatment of tumours of the bladder at the Brady Urological Institute.   He divides the tumours into benign and malignant papillomata, papillary carcinoma, and adenocarcinoma, squamous and scirrhus carcinoma.   In those classed as malignant papilloma, there are changes in shape, staining properties, and nuclei of the epithelial cells without any evidence of infiltration.   Experience has shown that patients die of cancerous metastases when these changes in the papilloma are the only evidence of malignancy which exists.   When the malignant papilloma has advanced to a point when infiltration of the bladder-wall has occurred, the author uses the term " papillary carcinoma."   Portions of tumours have been excised cystoscopically and examined histologically, but in the large majority of cases there was not sufficient alone to indicate whether the tumour would respond to fulguration, or whether more radical procedures should be adopted.   Cystoscopy and the clinical methods proved of greater service in differentiating between malignant papilloma and papillary carcinoma than histological examination. Fulguration was employed in 53 cases, 12 of which were inoperable carcinomata.   In none of the carcinomata did the fulguration make any impression on the tumour.   There was a considerable difference in response to fulguration between benign and malignant papillomata. The typical benign papillomata vanished rapidly, while malignant papillomata disappeared slowly.   Of 25 papillomata examined histologically, 17 showed the changes characteristic of malignant papilloma, but all were removed by fulguration, the benign and malignant differing from each other only in that the response was slower in the malignant types.   Of the 36 patients on whom fulguration was successful in removing the original tumour, recurrences are known to have occurred in 7, and in all of these it took place under a year. The tendency to recurrence grows progressively less after a year.

Thirty-four cases of tumour of the bladder were treated by excision, and of these only four were known to be well and free from recurrences during a period of four years or over.   Excision should be used only in cases which ordinarily would be suitable for fulguration, but, on account of some complication, that treatment has become impossible, or very difficult.   When the growth has infiltrated the bladder-wall, resection of the whole thickness of the wall, with as wide a margin of

healthy mucous membrane, is the only method that offers hope of success. The transperitoneal method, except in occasional cases, is not to be recommended. Resection was carried out in 24 cases, and 9 of these were well two years or longer after the operation. Of these 9, 5 belonged to the malignant papilloma type and 4 were small circumscribed papillary carcinomata. Radium was used most frequently in combination with fulguration, and the effect has been most striking. In three cases in which fulguration had been employed over long periods of time, and which had resisted very stubbornly, radium seemed entirely to change their nature, and they disappeared rapidly on resuming fulguration. He had not, however, succeeded in definitely eradicating the papillary or other infiltrating types of carcinoma. Cystectomy appeared from the results to be unjustifiable. A large percentage of cases were so advanced on first being examined that only palliative measures were adopted.

Barringer[15] reviews a year's work with radium in the treatment of carcinoma of the bladder and prostate. In carcinoma of the prostate, striking results were obtained both in early and in advanced cases. In early cases in which the carcinoma was fairly well confined to the prostate, and there was little or no perivesicular infiltration, shrinkage of the carcinoma occurred in all. In the observed cases this reduction was permanent. Ten months was, however, the longest period of time for which any of these had been followed. The symptoms in these cases showed striking improvement. The treatment was repeated in two or three months. The primary effect was to increase residual urine, but the ultimate effect was neither to increase nor decrease the residual urine. Radium has a sclerotic effect on carcinoma : it has absolutely no effect on hypertrophied prostate. Very large carcinomata with cachexia were beyond radium treatment.

In carcinomata a capsule of screened radium was placed in the bladder and allowed to remain for six to ten hours. If the carcinoma is on the vault or lateral wall, the patient lies on the abdomen or side. There may be no after-pain, or pain lasting some days to several weeks. The cases treated numbered 16, and of these 4 (1 early and 3 advanced) were cystoscopically free from growths, " one for $10\frac{1}{2}$ months, one for five months, and two recently."

REFERENCES.

1 *Surg. Gyn. and Obst.*, 1917, August, *i.e.*, 164. **2** *Boston Med. and Surg. Jour.*, 1917, ii, 10. **3** *Surg. Gyn. and Obst.*, 1917, January, 71. *Jour. Am. Med. Assoc.*, 1917, i, 591. **4** *Ibid.*, 589. **5** *Surg. Gyn. and Obst.*, 1917, January, 1. **6** *Jour. Am. Med. Assoc.*, 1917, February, 533. **7** *Surg. Gyn. and Obst.*, 1916, ii, 709. **8** *Ibid.*, 378. **9** *Jour. Am. Med. Assoc.*, 1917, i, 444. **10** *Surg. Gyn. and Obst.*, 1917, ii, 170 (abstr.). **11** *Lancet*, 1917, ii, 173. **12** *Med. Rec.*, 1916, ii, 235. **13** *Surg. Gyn. and Obst.*, 1917, ii, 646. **14** *Ibid.*, 655. **15** *Jour. Am. Med. Assoc.*, 1917, i, 1227, and ii, 1442.

MALIGNANT CHORIONEPITHELIOMA IN A MALE. FATAL
INTRA-PERITONEAL HÆMORRHAGE FROM RUPTURE
OF A METASTATIC GROWTH IN THE LIVER.

By F. PARKES WEBER, M.A., M.D., F.R.C.P.

[With Plates I.–II.]

I AM indebted for this case to Mr. W. Gifford Nash, F.R.C.S., of
Bedford, who kindly sent me portions of growth from the lungs, liver,
and lumbar region, and gave me permission to publish an account.

The patient was a strongly-built man, aged 23 years, who was
admitted, on February 15, 1918, to the Bedford County Hospital, under
the care of Mr. Gifford Nash, with signs of intra-peritoneal hæmorrhage.
He had apparently enjoyed perfect health until about February 4,
when he commenced to feel weak. He had been married at the
beginning of January. On February 11 he was admitted to the
Military Hospital in Bedford, having had slight hæmoptysis a few
days previously. No physical signs of pulmonary tuberculosis could be
discovered; but on February 15 there occurred hæmatemesis, melæna
and hæmaturia, and he was transferred to the Bedford County Hospital,
where he came under Mr. Gifford Nash's care, as above stated, with
signs of intra-peritoneal hæmorrhage. On opening the abdomen the
peritoneum was found full of blood, with arterial bleeding proceeding
from a rupture on the under-surface of the liver, along the left margin
of the quadrate lobe. This was packed, but the patient died an hour
later.

At the *necropsy* (by Dr. E. Gordon Anderson, the house surgeon)
the liver was found enlarged, and on its anterior, inferior, and posterior
surfaces there were irregular, nodular, hæmorrhagic purple areas of
growth about the size and shape of walnuts; they were subcapsular,
and shelled out readily. The spleen was enlarged, but contained no
growths, and the splenic substance was not diffluent. No growths nor
abnormal conditions were discovered by macroscopical examination of
the kidneys, testes, alimentary canal, and urinary bladder, excepting
that there were multiple submucous hæmorrhagic petechiæ in the
cardiac portion of the stomach, and the lower portion of the small
intestine contained blood. The urinary bladder was full of clear urine.
Immediately below and to the left of the bifurcation of the abdominal
aorta there was a retro-peritoneal mass, nearly as large as a cricket
ball, seemingly composed of lumbar lymphatic glands, which had the
same purple, hæmorrhagic appearance as the growths in the liver.
The heart showed nothing special. In the lungs, near the surface,
were multiple raised circumscribed areas of growth, purple and hæmo-
rrhagic, like those in the liver, but smaller; there were recent pleural

adhesions in the region of the right apex.

Mr. Gifford Nash sent me, as already stated, specimens of growth from the lungs, from the liver, and from the lumbar retro-peritoneal mass. The piece of liver sent me contained three purple nodules bulging below the hepatic capsule, the smallest being about the size of a large cherry and the largest (which was very friable) about the size of a walnut. On microscopical examination, all the tumours sent me (*see* Figs. 1–4) are seen to be absolutely typical growths of the type of malignant chorionepithelioma, a type of tumour—also called malignant placentoma and (erroneously) deciduoma malignum—which was formerly supposed only to occur in women. The microscopical sections all show large spaces or sinuses, which contain blood and clot (fibrin filaments), and which are more or less lined, partly with cubical or polygonal cells of the type of the cellular or " Langhans " layer of chorionic epithelium, and partly with syncytium, corresponding to the syncytial layer of chorionic epithelium as met with on the chorionic villous tufts in the normal and abnormal human placenta and in cases of chorionepithelioma. At many parts of the walls of the sinuses are blocks or clumps of cubical or polygonal cells of the Langhans type, and these are sometimes " capped " by enormous giant cells, or rather, as one should call them, by masses of undivided plasmodium-like syncytium (containing large numbers of nuclei), projecting into the sinuses.

Fig. 1 (Plate I.) is taken from one of the growths in the lungs, and represents ($\times$ 41) a large blood-sinus, the walls of which are lined by plasmodium-like syncytial masses (enormous multinuclear giant-cells). The syncytial lining covers—and at certain parts apparently encloses or includes—collections of polygonal cells, closely fitted together so as, in section, somewhat to resemble tesselated pavement. These discrete polygonal cells correspond to the cells of the Langhans layer of chorionic epithelium. Fig. 2 (Plate I.) is from one of the metastatic tumour-nodules in the lungs ($\times$ 160). The cellular mass represented is on the wall of a blood-sinus, and consists of polygonal cells of the Langhans type, closely fitted together without intervening fibres (as in Fig. 1), thus (in section) somewhat resembling tesselated pavement. This block of polygonal cells is seen at one part to be " capped " by a syncytial outgrowth—an immense, plasmodium-like, undivided giant-cell—with syncytial membrane-like prolongations on either side lining the blood-sinus. Fig. 3 (Plate II.) is from one of the nodules in the liver ($\times$ 160). Projecting from the wall of a blood-sinus is a mass which is composed partly of undivided plasmodium-like syncytium, constituting a kind of huge giant-cell, and partly of discrete polygonal cells of the Langhans chorionic epithelium type. Fig. 4 (Plate II.) is from the retro-peritoneal growth in the lumbar region ($\times$ 160). It represents a mass, consisting partly of discrete cells and partly of undivided syncytium, with a membrane-like syncytial prolongation to the left, lining a large blood-sinus.

REMARKS.

Owing to the work of recent years, it has become generally admitted
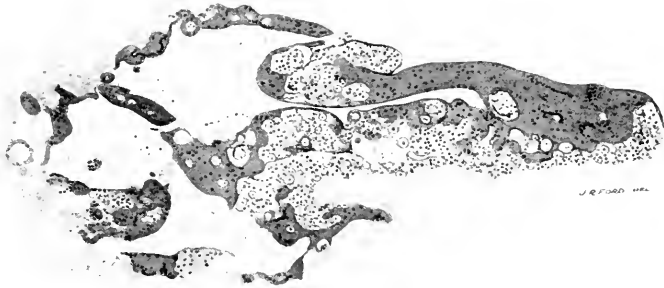
PLATE I.

FIG. 1.—From one of the growths in the lungs. It shows a large blood-sinus lined by plasmodium-like syncytial masses (enormous multinuclear giant cells). Under these (and in section sometimes apparently enclosed by them) are collections of discrete polygonal cells of the type of the Langhans layer of chorionic epithelium, somewhat resembling tesselated pavement. Magnification, × 41.
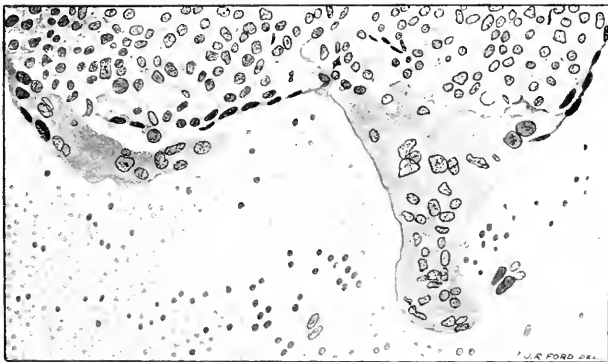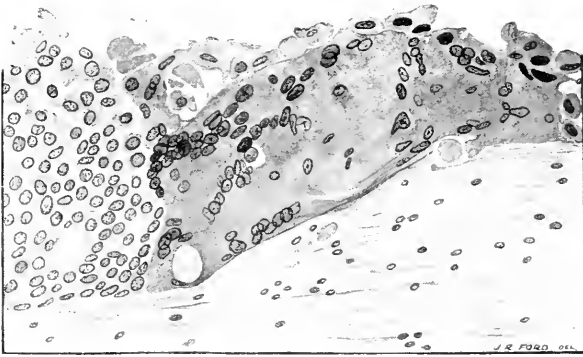

FIG. 2.—From the wall of a blood-sinus in one of the metastatic tumour-nodules from the lungs. It represents a projecting clump or block of polygonal cells of the Langhans type, closely fitted together without intervening fibres, somewhat like tesselated pavement. At one part it is capped by a syncytial outgrowth (an immense plasmodium-like undivided giant cell), with syncytial membrane-like prolongations on either side, lining the blood-sinus. Magnification, × 160.

PLATE II.

FIG. 3.—*From one of the tumour-nodules in the liver, showing a mass projecting from the wall of a blood-sinus. It is composed partly of undivided plasmodium-like syncytium, constituting a kind of huge giant-cell, and partly of discrete polygonal cells of the Langhans chorionic epithelium type. Magnification, × 160.*
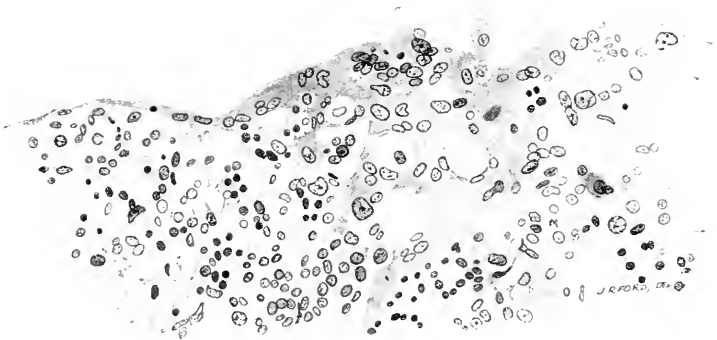
FIG. 4.—*From the retroperitoneal growth in the lumbar region. A mass consisting partly of discrete cells and partly of undivided syncytium, with a membrane-like syncytial prolongation to the left, lining a large blood-sinus. Magnification, × 160.*

—in fact, it has practically been proved—not only that the cellular layer of chorionic epithelium (the so-called " layer of Langhans ") is of fœtal origin, but that the syncytial (outermost) layer of chorionic epithelium is also a fœtal structure—a fœtal epiblast—as Langhans (1882) already regarded it (*cf.* J. H. Teacher, 1917). Marchand, in his important study of the subject, came to the conclusion that chorionepithelioma, being a tumour derived as it is from the chorion, could not possibly occur without pregnancy. In F. Eichhorn's case (1913) of chorionepithelioma in the brain and lungs of a woman, aged 32 years, no tumour could be found in the uterus (ten weeks after childbirth), but during the pregnancy or at childbirth chorionic cells and fragments of syncytium may, as has been demonstrated, be transported from the fœtal portion of the placenta by the maternal blood-stream, and thus lodge as emboli in the lungs and other organs of the mother. From such emboli chorionepitheliomata in the lungs, etc., may arise later on. This would account for a case like that of Eichhorn, and for that of B. Fischer (1913), in which an apparently primary chorionepithelioma developed in the liver of a woman, 35 years old, $1\frac{1}{2}$ years after her last pregnancy. In the same way Askanazy (1908) explains the case of a woman, aged 28 years, who died from so-called " primary " chorionepithelioma of the right lung, with secondary deposits in other parts of the lungs. That is to say, he suggests that the " primary " growth arose from normal chorionic cells which had been transported by the blood-stream to the patient's lungs during her pregnancy.

Numerous undoubted cases have, however, been recorded (several records of the kind are referred to under *Literature* at the end of this paper) in which, as in the present case, typical malignant chorionepithelioma occurred in males (the primary tumour being generally in the testis), or in females who have never been pregnant. Schlagenhaufer (1902) was the first to explain the occurrence of chorionepithelioma and vesicular mole-like structures in the absence of pregnancy, by attributing their origin to chorionic elements in teratomata or embryomata ; and Marchand's *dictum* that *no chorionepithelioma can arise without a pregnancy* has now been altered to : *no chorionepithelioma can arise without an embryo, or an embryoma or teratoma (cf. O. Straume).* Schlagenhaufer confirmed his views by describing two cases of malignant chorionepithelioma in men, in which the primary tumour was undoubtedly a teratoma in the testis. Retrospective examination of the literature of the subject shows that a case published by Waldeyer in 1868, as one of " Myxoma intravasculare arborescens " of the spermatic cord in a man, was one of malignant chorionepithelioma, and at the time of publication he compared the outgrowths to the villi of a vesicular mole. Kanthack and Pigg, in 1898, described the similar case of a man with a primary tumour of the testis and metastatic deposits lying free in the heart and inferior vena cava. In their case a branched mass, externally resembling a vesicular mole, projected from the tricuspid valve of the heart.

Cases of primary chorionepithelioma of the ovary in virgins have been published by L. Pick (amongst others) (in a girl, aged 9 years),

and by F. Michel (in a girl, aged 16 years). Bock (1900) described the case of a girl, aged 12½ years, from whom, at her fourth menstrual period, a typical vesicular (hydatidiform) mole came away *per vaginam.*

A remarkable case was that of Bostroem (1902), in which an intra-cranial chorionepithelioma was removed by operation from a man, aged 30 years. When the patient died, the post-mortem examination revealed a large retro-peritoneal tumour, and numerous metastatic tumours in the lungs, liver and kidneys, all of them having the macro-scopic and microscopic appearance of chorionepithelioma; the testes, as in the present case, appeared normal. It may be suggested that the primary growth in the present case, and in Bostroem's case, originated from teratomatous (embryomatous) elements in the retro-peritoneal region.

In Djewitzki's case (1904) the patient was a virgin, aged 75 years, in whom there was a chorionepitheliomatous growth on the posterior surface of the urinary bladder, with secondary tumours in the lungs, bronchial glands, spleen, and sigmoid flexure. In J. Ritchie's case (1903) the chorionepithelioma originated in connection with a mediastinal embryoma in a man. R. T. Frank (1906) described the case of a young man with a primary chorionepithelioma of the mediastinum and metastatic growths in the lungs and liver

From the *clinical point of view* it should be noted that loss of strength and slight hæmoptysis were the first symptoms of grave disease in the present case. Acute pulmonary or general disseminated miliary tuberculosis has been suggested as the clinical diagnosis in other cases. O. Straume, in 1910, recorded the case of a woman, aged 27 years, who died with signs of acute pulmonary tuberculosis. The post-mortem examination showed that the pulmonary signs were due to the presence of numerous metastatic tumours in the lungs, derived from a malignant chorionepithelioma of the uterus. It has been sug-gested that in similar cases the finding of syncytial cells in the sputum might give a clue to the correct diagnosis during life. In Askanazy's case (1908), already referred to (*see back*), a chorionepithelioma in the lungs was the primary tumour. Carnot and Marie published the case of a man, aged 37 years, whose left testis was removed for a chorion-epitheliomatous growth. A few months afterwards he suffered from dyspnœa and sanguineous expectoration. Clinically the case had been regarded as one of tuberculosis of the testis and of the lungs. M. Chuvin's case (1908) was that of a man, aged 20 years, with dyspnœa and cough, supposed to be due to acute disseminated miliary tuber-culosis. He really had a primary chorionepitheliomatous tumour of the testis, with numerous metastatic growths in the lungs.

The present case is, as far as I know, unique in regard to death having been caused by intra-peritoneal hæmorrhage, due to the bursting of a chorionepitheliomatous tumour in the liver into the peritoneal cavity. But, in reality, that is what might be expected occasionally to happen, just as in a woman, a malignant vesicular mole may burst through the uterine wall into the peritoneal cavity.

To Dr. Victor Bonney's excellent paper (1907) on " Chorionepithe-

liomata of Congenital Origin" I am specially indebted, notably in regard to his references to the literature of the subject. His first case was one of chorionepithelioma of the great omentum in a man, aged 69 years, who had been under the care of my hospital colleague, the late Dr. Fürth.

LITERATURE.

Askanazy: "Primary Chorionepithelioma of the Lung," report in *Presse Médicale*, Paris, 1908, Année XVI., p. 149 ; see also *Zur Kentnis der Chorionepitheliomatösen Wucherungen in den Teratomen der Keimdrüsen*, Leipzig, 1904.

Bernstein, J. M.: "Two Cases of Tumours resembling Chorionepithelioma occurring primarily in the Testicle," *Trans. Path. Soc. Lond.*, 1907, LVIII., p. 4. **Bock**: "Mole hydatidiforme chez un enfant de $12\frac{1}{2}$ ans." *Bull. de la Soc. Belge de Gyn. et Obstét.*, 1899-1900, p. 113. **Bonney, Victor**: "On Chorionepitheliomata of Congenital Origin," *Trans. Path. Soc. Lond.*, 1907. LVIII., pp. 9–38. **Bostroem**: *Verhandl. d. deut. Path. Gesellsch.*, 1903 (for year 1902), Vol. V., p. 212.

Carnot, P., and **Marie, R.**: "Sarcome angioplastique," *Bull. de la Soc. Anat. de Paris*, 1898, LXXIII., p. 82. **Chuvin, M.**: "Zur Kasuistik der Chorionepitheliome bei Männern," *Med. Klinik*, Vienna, 1908, IV., p. 1196.

Dillmann, H.: "Ueber einen Fall von Chorionepitheliom beim Manne." *Zeitschr. f. Krebsforschung*, Berlin, 1905, iii., pp. 61–72. **Djewitzki, W. S.**: "Chorionepithelioma der Harnblase," *Virchow's Archiv*, 1904, CLXXVIII., p. 451.

Eichhorn, F.: "Ein Fall von Heterotopen Chorionepitheliom in Gehirn und Lungen," *Zeitschr. fur Krebsforschung*, Berlin, 1913, Vol. XIII., pp. 42–62 (with many references to the literature of the subject). **Emrys-Roberts, E.**, and **Hall, I. Walker**: *Journ. of Path. and Bact.*, Cambridge, 1910, XIV., p. 135.

Fischer, B.: "Primäres Chorionepitheliom der Leber," *Frankfurter Zeitschr. für Pathologie*, 1913, XII., pp. 462–480. **Fraenkel, L.**: "Das vom Epithel der Chorionzotten ausgehende Carcinom des Uterus (nach Blasenmole)," *Arch. für Gynäkol.*, Berlin, 1895, XLVIII., pp. 80–102. **Frank, R. T.**: "Chorionepitheliomatous Proliferations in Teratomata, especially in those of the Testicle," *Journ. Amer. Med. Assoc.*, 1906, XLVI., pp. 248, 343.

Gruner, O. C.: "A Case of Chorion-Epithelioma of the Testis," *Lancet*, London, 1910, I., p. 790.

Hicks, H. T.: "Tumour of the Testicle," report in *Lancet*, London, 1906, I., p. 1471.

Kanthack, A. A., and **Pigg, T. S.**: "Malignant Enchondroma of the Testis," *Journ. of Path. and Bact.*, Cambridge, 1898, V., p. 89.

Langhans: *Über die Zellschicht des menschlichen Chorions* " (Festschrift für Henle), Bonn, 1882. **Lawrence, T. W. P.**: "Chorionepithelioma of Testis," *Trans. Path. Soc. Lond.*, 1907, LVIII., p. 1. **Loele, Leo**: "The Parthenogenetic Development of Ova in the Mammalian Ovary and the Origin of Ovarian Teratomata and Chorion-Epitheliomata," *Journ. Amer.*

Med. Assoc., 1911, LVI., p. 1327.

Marchand, F.: *Monatschr. für Geburtshülfe und Gynäkol.*, Berlin, 1895, Vol. I., pp. 419, 513; *Zeitschr. für Geburtsh. und Gynäkol.*, Stuttgart, 1895, XXXII., pp. 405–472; 1898, XXXIX., pp. 173–258; "Malignes Chorione-pitheliom," *Berliner klin. Woch.*, 1898; *Journ. of Obstet. and Gynæc. of Brit. Emp.*, London 1903, IV., p. 74 (translation). Michel, Fritz: "Ein Karzinom des Eierstockes mit Chorionepitheliomartigen Bildungen," *Zentral-blatt f. Gynäk.*, Leipzig, 1905, XXIX., p. 422.

Pick, Ludwig: *Berl. klin. Woch.*, 1897, XXXIV., pp. 1069, 1097; 1902, XXXIX., p. 1189; 1904, XLI., pp. 158, 195; *Centralblatt für Gynäk.*, 1903, XXVII., p. 1110; 1905, XXIX., pp. 545, 821; *Virchow's Archiv.*, 1905, CLXXX., p. 172.

Risel, W.: "Ueber das maligne Chorionepitheliom und die analogen Wucherungen in Hodenteratomen," *Arch. aus d. Path. Instit., Leipzig*, 1903; "Ein Fall von sog. primären Chorionepitheliomen der Scheide, Leber und Lungen nach Blasenmole," report in *Zentralblatt für Gynäkol.*, 1907, XXXI., p. 671. Ritchie, James: "Embryoma occurring in the Mediastinum," *Journ. of Obstet. and Gynæc. of Brit. Emp.*, London, 1903, IV., pp. 65–73.

Sänger, M.: "Über Sarcoma uteri deciduocellulare und andere deciduale Geschwülste," *Archiv für Gynäkol.*, Berlin, 1893, XLIV., pp. 89–148. Schlagenhaufer, F.: "Chorionepitheliomund traubenmolenartige Wucher-ungen in Teratomen," *Wien. klin. Woch.*, 1902, XV., pp. 571, 604; *Verhandl. d. deut. Path. Gesellsch.*, 1903 (for year 1902), p. 209. Scott, J. A., and Longcope, W T.: "Malignant Tumour of the Testicle resembling Chorion-epithelioma," *Bull. of the Ayer Clin. Lab., Pensylv. Hosp.*, Philadelphia, 1905, No. 2, pp. 56–70; see also *Proc. Pathol. Soc. of Philadelphia*, 1909, New Series, XII., pp. 8–16. Spilsbury, B. H.: "Malignant Teratoma of the Testis," *Lancet*, London, 1906, I., p. 1471. Steinhaus, J.: "Über chorion-epitheliomartige Wucherungen beim Manne," *Wien. med. Woch.*, 1903, LIII., column 793. Straume, O.: "Über einen unter dem Bilde einer Phthisis florida verlaufenden Fall von Malignen Chorionepitheliom," *St. Petersburger med. Woch.*, 1910, XXXV., p. 371.

Taylor, H. N.: "A Case of Chorionepithelioma," *Lancet*, London, 1916, II., p. 644. Teacher, J. H.: "Chorionepithelioma . . . and Mole-like Struc-tures in Teratomata," *Journ. of Obstet. and Gynæc. of the Brit. Emp.*, London, 1903, IV., pp. 1–64 (with many illustrations); article on "Chorionepithelioma Malignum," in T. W. Eden and C. Lockyer's *New System of Gynæcology*, London, 1917, Vol. III., pp. 555–593. Tirumurti, T. S.: "Chorionepithelioma of Retained Testis with Multiple Metastatic Growths," THE PRACTITIONER, London, 1913, XC., p. 814.

Waldeyer: "Myxoma intravasculare arborescens funiculi spermatici," *Virchow's Archiv.*, 1868, XLIV., p. 83. Williams, J. W.: "Deciduoma malignum," *Johns Hopkins Hospital Reports*, Baltimore, 1895, IV., pp. 461––504 (with references to much older literature on the subject). Wlassow, K.: "Zur Lehre der embryoiden Geschwülsten" (Dissert), Moskau, 1903, quoted by M. Chuvin; "Über die Patho- und Histogenese des sog. *Sarcome angioplastique,*" *Virchow's Arch.*, 1902, CLXIX., p. 220.

SOME UNCOMMON CAUSES OF PELVIC HÆMORRHAGE IN WOMEN.

By GORDON TAYLOR, M.A., M.S., B.Sc., F.R.C.S.

Temporary Major R.A.M.C., Senior Assistant Surgeon, Middlesex Hospital, etc.

THE object of this short paper is to draw attention to one or two uncommon causes of pelvic hæmorrhage in women. Two of the cases are remarkable; one was a case of twins in a single ectopic gestation sac; in the other, a disorderly growth of lutein tissue brought a young woman to the brink of the grave.

Pelvic surgeons are familiar with the liability of extra-uterine gestation to be bilateral, but a single tube gravid with twins is indeed a freak of nature.

CASE 1.—*Ectopic Gestation ; Twins in one Gestation Sac of Tubal Origin.*—A little Frenchwoman, married, and about 22 years old, was admitted into Founder Ward, Middlesex Hospital, in the summer of 1913, suffering from an acute abdominal condition, and, in the absence of my senior colleague, Sir John Bland-Sutton, I was asked to come and operate upon the case. Her condition and the history were such as to suggest a severe abdominal hæmorrhage of probably pelvic origin. She had been married two or three years, had no children, and there was a history of a missed " period," followed by an acute attack of pain some days before admission, and then the violent catastrophe which brought her for immediate relief to the hospital in a desperate condition.

A median sub-umbilical incision revealed the presence of about four or five pints of blood in the peritoneal cavity, and an investigation of the source of the hæmorrhage revealed a large mass of clot projecting from the posterior surface of the right broad ligament. The right tube was swollen and had been the site of the primary gestation sac, which had undergone an intraligamentous rupture; the secondary sac had formed in the right broad ligament, and this had, in turn, given way. The attack of pain ten days before admission doubtless corresponded to the rupture of the primary gestation sac, and it was the rupture of the secondary sac which produced the alarming symptoms from which the woman was now suffering. In the blood-clot between the layers of the right broad ligament, and extruding from the rent, were found a complete embryo in good condition, and the head and shoulders of a second one. They were handed over, for purposes of investigation, to the Anatomical Department, and Dr. R. J. Gladstone kindly informed me that the intact embryo had a length of 32 millimetres. There was no flaw upon the complete fœtus to suggest that the second head and shoulders were a part of some monstrous form, and the portion of the second embryo present was perfect in so far as it existed. Search of the blood-clot failed to discover the remainder of the twin.

Considerable difficulty was experienced in controlling the hæmorrhage

from the placental site on the lateral border of the uterus, and a series of mattress-sutures was required to secure this. The sequel was a tragic one, since a fortnight later the patient suddenly developed acute intestinal obstruction, which, on operation, was found to be due to a coil of small intestine, which had become adherent to the bottom of the pelvis in the region of the former placental attachment at the side of the womb. The coil was released, and it was hoped that the condition would be thereby relieved, but the bowel failed to empty itself, and a jejunostomy was performed. This vent relieved the urgent symptoms, but all efforts undertaken later to close the opening failed ; the patient rapidly lost strength, and finally died of inanition.

The case has several features of interest : first, the condition of twins in a single gestation sac must be excessively rare ; although I have no present access to any literature, I am aware that the condition is not unique. Secondly, it is probable that the performance of hysterectomy for the bleeding from the side of the uterus, instead of the laborious insertion of mattress-suture after mattress-suture, might have obviated the acute obstruction from which the patient died, but the condition of the patient at the time of the original operation must be borne in mind. Thirdly, the vivid manner in which this little Frenchwoman's death still remains indelibly fixed in my mind is a criterion of the almost uniformly certain aid that surgery can bring to luckless sufferers from an ectopic pregnancy.

CASE 2.—*Severe Hæmorrhage in connection with Lutein Cysts of the Ovary.*—Some years ago, a young unmarried woman was sent up to Middlesex Hospital by a doctor in the south-west of London, with a diagnosis of an acute abdominal condition, which demanded immediate surgical intervention. The patient arrived at hospital in the early hours of a December morning, and on being lifted from the ambulance to the receiving room, appeared to be a case rather for the mortuary than for the operating theatre. She was profoundly collapsed, dead-white, and pulseless, and seemed to be suffering from severe internal hæmorrhage.

She was taken to the theatre and warmed, and two pints of saline solution were infused into her median basilic vein. While the infusion was actually proceeding, the abdomen was rapidly opened and some five or six pints of blood were evacuated from the abdominal cavity. When an inspection of the pelvic organs became possible, the hæmorrhage was seen to be coming from a rent on the right ovary. The right tube and ovary were removed; the uterus and the left pelvic appendages appeared normal. The patient's recovery from the operation proved uneventful, except for the passage of a large ascaris.

The case, at the time, was regarded as a probable primary ovarian gestation, but careful microscopic examination failed to reveal any evidence of chorionic villi, and sections of the ovary in the region of the rent showed only blood cells and lutein tissue. This severe bleeding came, then, either from a rupture of a corpus luteum, or from a small lutein cyst of the ovary and the later history of the case would seem to support the latter view.

Some eighteen months afterwards the patient, who was still an unmarried woman of about 24 or 25 years of age, presented herself at my out-patient department, complaining of pain in the lower part of the abdomen, which she described as similar to that which she experienced at the time of her

former disaster. Pelvic examination revealed the presence of a swelling on the left side of the pouch of Douglas; and the patient, mindful of her former plight, only too readily agreed to the operation which was advised. When the abdomen was opened the left ovary was found to be converted into a congeries of lutein cysts, some of which had ruptured and bled moderately into the pelvis. A left-sided oophorectomy was performed, and the patient made a good recovery.

The case is instructive in that each ovary became in turn the site of lutein cyst formation, and that on each occasion pelvic hæmorrhage occurred. Cuthbert Lockyer drew attention to the severe hæmorrhage which may be associated with lutein cysts, but the bleeding which had occurred, when this poor patient was admitted on the first occasion into hospital, was the most profuse I have ever seen in any abdominal operation. It must be borne in mind that a severe hæmorrhage may come from a corpus luteum either spontaneously or as a result of some slight injury. Primrose, Ohman, Seedorf, and others have described such cases. The history seems to negative this as a cause of the hæmorrage in this instance.

The case has a further point of interest in that it was left to the microscope to vindicate the character of an affianced, but unmarried, girl.

CASE 3.—*Interstitial Tubal Pregnancy ; Pelvic Hæmorrhage ; Hysterectomy.*—A music hall artiste, 28 or 29 years of age, living in South London, was seized with pain in the lower part of the abdomen one evening. She had had two children, aged 5 and 6 years respectively, and there was a history of a missed " period," which should have come on about a fortnight before this attack of pain occurred. There was now some loss by the vagina, and a pelvic examination revealed some fullness in the pouch of Douglas. The patient was rather blanched, and the lower part of the abdomen was somewhat distended; the degree of pallor was out of proportion to the amount of blood lost by the vagina. A diagnosis of internal hæmorrhage was readily made, and this seemed almost certainly due to a leaking tubal pregnancy.

The abdomen was opened, and about a pint and a half of blood was found in the cœlom. The right tube was found to be swollen, and the abdominal ostium was still patent and dripping blood. The tubal swelling extended right to the womb, and involved the uterine segment.

A sub-total hysterectomy was performed, and the right and left appendages were removed; the left ovary was spared. The patient made a good recovery, and the conservation of the one ovary left her not only nubile but also temperamentally fit for the exacting demands of her arduous profession.

On laying the uterus open in the coronal plane, the gestation sac was seen to be situated in the uterine segment of the tube; the ampullated portion of the tube contained blood, and the sac had apparently ruptured into this, and the blood had escaped into the abdominal cavity.

The case is interesting in that a bizarre site for an ectopic pregnancy necessitated a very radical operation for its cure.

AN UNORTHODOX VIEW OF DISEASES OF THE APPENDIX.

By J. C. BARKER, M.R.C.S.

Surgeon to Watford Hospital, etc.

So much has been written on the affections of the appendix that further comment appears superfluous, but investigation shows that attention has almost entirely been confined to the infection of the peritoneum, which gives such evident signs of the mischief going on.

It might almost be inferred from the literature, that appendicitis, which does not attract attention to itself in this way, is of no importance and can safely be ignored. This is a dangerous heresy, for which the text-books are chiefly to blame. The capacity of the appendix for creating trouble goes far beyond the local inflammation. The local peritonitis, commonly known as appendicitis, is an accidental complication of this disease, and is always amenable to prompt treatment, whilst the appendicitis which does not or without this danger signal, is frequently the cause of serious visceral lesions or general toxæmia. In fact, the patient whose appendix infects the peritoneum acutely, early, and locally, is to be congratulated, in that the signs compel attention and ensure early removal of the focus. It is so often assumed that there can be no gross disease of the appendix without the physical signs of peritonitis, that it is impossible to lay too much stress on the fallacy and danger of this belief.

There is no doubt that in congestion of the mucous membrane from whatever cause, there is a great increase in virulence of the B. coli. There is equally no doubt that a virulent strain of B. coli causes congestion of the mucosa. Here are the elements of a vicious circle, the one intensifying the other. This is the controlling factor in disease of the appendix and in the affections originating from it.

The appendix is part of the large bowel, and its mucous membrane is continuous with that of the cæcum, so that it shares in any disturbances of nutrition, but it does not share the facilities of the colon for efficient emptying and cleansing. In consequence of these defects, any disorder of the large bowel tends to be intensified and perpetuated in the appendix.

Taking into consideration these disorders and their frequency in early life, it is a matter for surprise that anyone escapes some form of appendicitis, and speaks well for the resistance of the lymphoid tissue. Whether and in what direction the potential mischief, which must so often be there, develops, depends on many factors, the principal

ones being :—the size of the lumen, influencing discharge into cæcum ; mobility, and the extent to which this is controlled by position and attachments ; nature of the opening into cæcum, whether constricted or valvular ; efficiency of the musculature ; adequacy of the blood and lymph supply. As we have no means of gauging any of these factors, we are unable to forecast the nature or scope of any appendix trouble, or to differentiate between the chances of local inflammation or toxic poisoning. Even if we could do this, and could say definitely that a case was running no risk of an acute peritonitis, there would still be the risk of cultivating a virulent strain of B. coli along the whole course of the large intestine, with the attendant interference with digestion and nutrition ; the subsequent lowering of general health lays the organs more and more open to attack from the toxins the colon is busy in preparing. An acute local peritonitis is the lesser of two evils.

A diagnosis of appendicitis should not depend upon infection of the peritoneum, for two reasons. Peritonitis is frequently a late complication in the disease, and before it develops irreparable damage has probably been done to the organism. Many cases of appendicitis never eventuate in acute peritonitis, and, as they are unsuspected, give rise to more danger and invalidism than those with acute infection.

The anatomy of the parts throws much light on the origin of the disease, on the way it spreads, and on the complications. At the junction with the cæcum, the appendix is seldom more than an inch, often less than half this distance, from the ileo-cæcal valve. The mesentery, usually derived from that of the small intestine, frequently fails to extend for more than a portion of the length, thus depriving the part distal to it of some of its blood supply. The blood is provided by the mesentery, and by the appendicular branch of the ileocolic, which runs close to the wall of the appendix, and also supplies the ileo-cæcal valve. The lymph channels run to a gland in the ileo-colic angle, and are sometimes connected with those in the pelvis by a fold of peritoneum which goes from appendix or meso to the ovary (plica vascularis Lockwood). This fold explains the ovarian pain and interference with menstruation, so often met with in appendix trouble, which we used to treat with iodine paint, and call ovaritis. Owing to its proximity to the ileo-cæcal valve, it is easy to see how any increase in size or weight of the appendix, or any pull by contracting adhesions, is likely to upset the delicate mechanism of this valve. It is conceivable, that in this way a purse-string suture introduced with too wide a sweep may do harm by the traction exerted on the part.

The minute anatomy is still more worth investigation. The walls, which correspond with those of the cæcum, going from within out consist of :—A single layer of columnar epithelium cells ; a layer of loose connective tissue, carrying blood and lymph channels and containing numerous tubular glands ; a muscular coat, consisting of inner circular fibres, and outer longitudinal ones, the latter irregularly distributed and having intervals between the bands ;

subperitoneal tissue, and peritoneum.

The mesentery is made up of loose connective tissue, with blood vessels and lymphatics, between peritoneum.

The inner lymphatic layer of the appendix is continuous through gaps in the muscular wall with the cellular tissue in the mesentery. This is of some importance, for it means that there is only one line of epithelial cells separating the lumen of the appendix from the lymphatics of the mesentery.

It is evident that any erosion or shedding of epithelium in the appendix, at once throws open the lymphatics of the mesentery to invasion. Any adenitis or inflammation of the mesentery entails corresponding interference with the movements of the appendix. The contraction of the mesentery after adenitis is the cause of those kinks, twists, and torsions which are so prolific in giving trouble. It is, moreover, plain that the appendix will act as a culture-tube directly the power to empty itself is impaired, and in direct proportion to the impairment. Any adenitis spreading beyond the superficial layer of the mucosa predisposes to further attacks, by reason of the contraction of the cellular tissue which blocks the blood and lymph paths, and thus interferes with nutrition and resistance.

And though while this is happening it does not give any gross physical signs, the process of anchoring the appendix and converting it into a stationary culture-tube goes steadily on. The sequence of events is probably the same in the inception of every case :—

First.—Slight congestion of the mucosa of bowel and appendix, due to irritation by food, drugs, or fæcal matter causing shedding of epithelium, this is followed by invasion of the open lymph spaces by toxins and bacteria.

Second.—Adenitis spreading by direct continuity to the meso. When this point is reached, the course varies ; a few cases clear up leaving no trace. In the majority, recurrences bring on a chronic thickening and contraction of the meso, and serious mischief, local or general, frequently both, is inevitable, though it may be years before it comes to a climax or is recognized.

The local developments may be tabulated somewhat as follows, though the variations are infinite :—

1. Stricture, and accumulation beyond from swelling of the mucosa ;

2. Contraction of the meso anchoring appendix, gradual collection of secretion and bacteria, to eventuate in—(a) Empyema of the appendix ; (b) Inspissation and formation of fæcal concretions.

3. Kinks, twists, or torsions, from contraction of the meso. These may be either acute or chronic.

4. Chronic uniform thickening and contraction of the connective tissue gradually obliterating blood-vessels and lymphatics, until the appendix and in part the meso, consist of little beyond this fibrosed tissue. This is one form of the so-called natural cure, which is neither natural, nor a cure.

5. Recurring slight attacks, each due to septic thrombosis of a fresh area of mucosa until this has practically disappeared, when the

raw surfaces may coalesce; in this way the lumen is obliterated, and another form of natural cure results.

6. Septic embolism or thrombosis of an important vessel, followed by gangrene of the whole or part of the wall.

7. Escape of toxins or bacteria in sufficient force to overcome resistance, and set up a local or general peritonitis.

8. Gangrene, from slow strangulation of vessels by a fibrosing messo.

9. Obstruction of bowel, due either to bands from adhesive peritonitis, or to paralysis from acute peritonitis.

Some of these troubles, or variations of them, are bound to follow, once an adenitis is established. So that considerable local mischief is certain, though it may take long to mature. All the time that this is brewing, general conditions are developing which will prejudice the future of the individual and his prospects in life far more than any local inflammation. Even in the worst forms of local trouble, neither health nor life are necessarily endangered.

One of the greatest difficulties is, that the disease may have been in existence for a long time, and may have done much damage before giving sufficient pain or physical signs to attract attention. The start thus gained is often a matter of years, yet people expect their insides to revert to a normal condition directly the appendix has been removed. The bacteria of the intestine, which have taken years to attain a certain malignancy, may take months to lose it.

Probably some of the most harmful effects of disease of the appendix are those which are due to interference with the smooth working of the ileo-cæcal valve. According to Keith, Hurst, and other observers, the mechanism of this valve is very complicated and delicate, and is apparently linked up with that of the pyloric sphincter. The normal state of this valve is one of tonic contraction, and as the intestinal contents arrive there, they are held up for a period varying from one to three hours; segmentation then begins with partial and intermitting relaxations of the sphincter. As soon, however, as the next meal enters the stomach active iliac peristalsis begins, and the liquid chyme is squirted at regular intervals into the cæcum.

Any disease which disturbs the mechanism, seems to take effect in the inhibition of relaxation, thus damming back the ileal effluent. It is an interesting question, whether this obstructive action reflected on to the pylorus is responsible for those epigastric symptoms in appendicitis, which are so suggestive of duodenal trouble. It certainly causes indigestion and flatulence, and the prolonged retention of effluent entails decomposition and the increased production and absorption of toxins.

This brings up for consideration the much debated question of alimentary toxæmia. There can be no question about the baneful effects of toxins from the alimentary canal on all the tissues and organs of the body through which they pass. These effects are felt chiefly by those organs which are specially charged with their elimination. (Liver, kidneys, skin.)

The explanation of intestinal stasis and alimentary toxæmia, most

widely received at the present time, is the mechanical one advocated by Sir Arbuthnot Lane. This theory may be condensed as follows:— Intestinal stasis is due to man having assumed the upright position, in spite of the fact that the contents of his abdomen were arranged for horizontal working. Owing to this thoughtless change of attitude, a tendency has been developed for all the abdominal viscera to drop. In order to counteract this ptosis, numerous bands or peritoneal thickenings were gradually evolved. (Crystallized resistances, Sir Arbuthnot Lane.) These bands may give rise to kinks, or constrictions of the gut at the various points of attachment.

The two places, where troubles from these causes are most often found, are the appendix and the terminal ileum. A band is generally fixed in the length of the appendix, where the pull on this causes an acute kink and hence appendicitis. A band is often found about four to six inches from the cæcal junction, and the traction exerted by this in opposing the drop of the ileum, produces an acute kink. The retardation in rate of flow of the intestinal effluent caused by these kinks, added to that produced by the original ptosis, is responsible for chronic constipation and stasis, resulting in decomposition and the subsequent absorption of toxins.

Now, whenever there is intestinal obstruction, whatever the cause, there will be toxæmia in proportion to the degree of obstruction; but this is due to the accompanying irritation and interference with nutrition, which produce congestion of the mucous membrane, with its corollary an altered strain of B. coli.

There does not seem to be any proof that constipation by itself, or simple slowing of the rate of discharge from the bowel, will give the train of effects understood by the term alimentary toxæmia. In fact, the evidence points the other way. A rate of progress which is normal in one man would in another produce decided symptoms of toxæmia. There are people who habitually retain the contents of their intestine for two or three days without ill effect; there are others, though not so many, who carry it for longer without detriment.

On the other hand, toxæmia to a very pronounced degree is found in many diseases which are accompanied by undue acceleration of the rate of movement of the contents of the bowel. An ordinary diarrhœa for only a few days will give symptoms, so will dysentery, gastro-enteritis, or enteric, while in colitis it is the usual thing. It is plainly evident then, that although chronic constipation may and does give rise to toxæmia, there are many exceptions. It is also true that in the exactly opposite state of the gut (diarrhœa) toxæmia is common. The factor common to both these states of the intestine is that of irritation of the gut. In both, irritation means increased malignancy of the B. coli, and this in turn increased virulence of toxins.

The deduction is unavoidable, that it is the virulence of the bacteria which matters and dominates the situation, and not the rate of movement of the effluent. It is possible, even probable, that those bands which are supposed to be the cause of stasis and trouble may, in truth, be the effect. There is no apparent difference between

the crystallized resistances and those post-operative or inflammatory adhesions which are admittedly septic.

Toxins escaping at the points of least resistance and following the lines of peritoneal flow, would approximate to the paths of Lane's resistances, and give the same result in bands and thickenings. Given toxins of virulence, the points from which they would escape are precisely those chosen by the most definite resistances, namely, the angle formed by the distended terminal ileum, and the point of the angle of a kinked appendix. This seems a more plausible theory, if we assume increased virulence of toxins, we can explain both toxæmia and resistances. The appendix is the part of the large bowel which gets most frequently into trouble. The important point is that in any congestion, no matter how trivial, the bacteria become virulent and are capable of infecting and re-infecting the colon.

It is exceptional during operations or after death to find an appendix which is macroscopically healthy, and those microscopically healthy must be more scarce still. An appendix which is nothing but a fibrous cord, had a lumen at one time, and the destruction of this has been effected by a pathological process. An appendix full of malignant B. coli, partly anchored as it would be after any adenitis, would act essentially as a culture-tube.

To sum up. Increased toxicity of the intestinal flora is the factor common to all intestinal toxæmias. The conditions producing this common factor occur far more often in the appendix than in any other part of the intestines; and as, by interference with the ileo-cæcal valve, the same conditions also produce the contributory factor of stasis, the conclusion is difficult to avoid, that in the majority of intestinal toxæmias the appendix is the originator, and that when it does not originate it maintains.

When the two causative factors can be produced by an organ so often diseased as the appendix, it is not a matter for surprise that alimentary toxæmia is common. Apart from alimentary toxæmia, the variety of ills produced by these toxins is almost infinite. They range from the bilious attacks of childhood, through toxic diseases of organs, to those advanced and general toxæmias which justify short circuiting or the ablation of the colon. In spite of this, the decision on the question of the removal of an appendix is almost invariably governed by the local condition, and it is seldom that any attempt is made to diagnose disease of the appendix until local signs force themselves on attention. Even at this time of day, removal of an appendix in the absence of local inflammation would be condemned by the bulk of the profession as unjustifiable.

The difficulties of recognizing disease in the early stage are very great, but this is the more reason why attention should be directed to it. Once the desirability is recognized, the problem will have a chance of solution, but if we continue to wait for local symptoms, we give the appendix time to start toxic mischief which will not be arrested by removal of the appendix later on. A careful examina-

tion of the cæcal region should be made in every case of flatulent indigestion, bilious attacks, or general malaise for which there is no ostensible cause, bearing in mind that the *appendix may be badly diseased without giving pain to the patient or definite sign to the examiner.* In any doubtful case, the die should be cast in favour of operation. The mortality is practically nil, the invalidism from toxins is enormous.

The inflammatory state of the gall-bladder, which is to blame for the formation of calculi, is generally held to be the result of infection from the intestine. The invasion may be up the intestine, from colon to gall-bladder, or through the liver. The theoretical probability of this mode of origin is confirmed by examination of the appendix in cases of gall-stones, disease is nearly always found.

Duodenal ulceration, which is also rightly ascribed to intestinal infection, may be caused by ascending B. coli, sepsis from a diseased appendix, or interference with the ileo-cæcal valve, possibly by a combination of these factors. Whether or not this is the true origin, it is a fact that in every duodenal ulcer that comes to operation the appendix is found diseased. In these duodenal cases the appendix is usually an old adherent retro-cæcal one. On the face of it, this seems antagonistic to the theory of sepsis, but it must be borne in mind, that we do not know for how long duodenal trouble may exist before it gives rise to special symptoms; judging from the appearances at operations and comparing them with the histories, the mischief has in many cases lasted a long time before giving rise to duodenal symptoms.

In this connection, it is curious how often hæmorrage or perforation occur in very fat people who have never complained of any symptoms. It seems as if the fat and the absence of symptoms were both due to the same cause, *i.e.*, the hunger-pain, which, by inducing them to take constant snacks puts on the fat and satisfies the craving; the same thing may be answerable for some chronic drinkers. Rheumatism, acute, subacute, or chronic, is one of the most common manifestations of toxin poisoning, and affects bones, joints, muscles and ligaments, the toxin very frequently responsible being that of the B. coli.

Colitis is in the great majority of cases a direct extension from the appendix, and in such cases an early appendicectomy would have forestalled it. In those cases which have a different origin, the appendix soon becomes more or less anchored, and then, taking on the function of culture-tube, it reinfects the colon time after time. We all know these cases of recurring colitis and how distressing they are, how they reduce their victims to toxæmic, neurasthenic wrecks. The idea of treatment by means of an appendicostomy was good, but has been found a failure in practice. The reason of the failure is that the operation necessitates anchoring the cæcum and continuous irritation of the mucosa.

I have seen the recurrences arrested in a considerable number of these cases by removal of the appendix, and I am convinced that the adoption of appendicectomy as a preliminary to treatment would give far better results than those we now get.

The urinary tract is one of the commonest seats of colon infection.

In the case of females, an ascending infection from the anus up the urethra is frequent, but we have to avoid the danger of jumping to the conclusion that this is the source in every case. In the male, anal infection is almost unknown. Normal B. coli cannot escape from the bowel and infect the urinary tract through two thicknesses of uninjured peritoneum; when infection occurs, it is due to abnormal B. coli or a weakened resistance, very likely to both. Any lesion in any part of the bowel will provide the port of exit, or any lesion in any part of the urinary tract will provide the port of entry. Careful search should be made for a possible cause of a lesion, such as fæcal retention, diverticula, gall-stones, calculi, growths of bladder or bowel, obstruction, etc.

But far and away the most frequent cause is the appendix, and, I believe, this is so even in females. The identification of the appendix as the offender is very difficult, because in most of these cases it lies behind the cæcum and ascending colon and gives no sign of its presence, except perhaps a tender area over the right kidney during the attacks of infection, but this is often masked by the predominance of other symptoms. During the intervals there is no hint of trouble in the appendix, and there is nothing in the history to put an unsuspecting practitioner on the trail, so that they stand a good chance of prolonged vaccine treatment. The nocturnal enuresis of children is sometimes due to colon invasions of the bladder from a pelvic appendix; I have personally had some half dozen cases.

In deciding the question of operative interference in disease of the appendix, the extent and probabilities of the local mischief should not be the main factors taken into consideration. The certainty that toxic poisoning in some form or other is sure to come, makes it a duty to advise operation for the slight cases. If further justification is wanted, it can be found in the fact, that sudden gangrene may occur two or three years after a very slight attack, without sufficient indications in the meantime to attract attention. This is shown in these two cases :—

A labourer of about 35, seen with very slight signs of trouble in the appendix, refused operation and went to work on the third day without sign or symptom. Two years after he was suddenly seized with pain in the appendix region. I operated four hours from the onset of pain, to find an appendix which had gangrened as a whole. This man declared that he had felt no pain or discomfort in the interval.

The other is a similar case.

A man of 25 had a few sharp pains in the appendix region; there was slight tenderness on deep pressure in the iliac fossa, and doubtful increase in resistance. I was not quite clear about the diagnosis, and did not propose operation. Two years followed without a sign of trouble, the man doing his work as a carpenter. Then one day he felt a general stomach-ache at one o'clock, but kept on with his work until seven, when he bicycled home; the pain was then severe. At the operation at 9.30, the appendix was completely gangrenous.

These are samples of what is called fulminating appendicitis; in

reality, it is not a rapid disease under any circumstances; the position the appendix occupies is answerable for the varying intensity of the indications of disease.

The first onset of adenitis of the meso gives some pain from the inflammation of its peritoneal covering; after this, which may last only a short time, cellulitis and contraction continue to obstruct the blood-supply more and more, until the point reached is at which thrombosis produces gangrene, but the starvation of the appendix is painless to within a few hours of the gangrene. In the absence of peritonitis the local signs of trouble in the appendix are slight, but sufficient indications can generally be made out with care. A small increase in muscular resistance, proportionate to the underlying damage, is almost invariable. An area of hyperæsthesia often shows itself.

An appendix which is the subject of adenitis can be palpated much more easily than a normal one, and will feel hard and resistant to the touch (and when an appendix has been felt under the fingers a few times, there will be no possibility of confusing it with muscle fibres). A diseased appendix will be tender to deep pressure, which gives as a rule a sharp acid sort of shoot to the left hypochondrium; the pain from pressure on the ileo-cæcal valve is quite different, and can readily be distinguished.

The retro-cæcal appendix is the hardest to catch early; a feeling of fullness to palpitation in the right loin and over the kidney, and a slight increase in muscular resistance, are frequently the only physical signs of a badly diseased appendix, which in any other position would have caused a well-marked peritonitis.

Recurring stomach-aches in children are almost sufficient in themselves, without local signs, to condemn the appendix, and the same thing applies to bilious attacks. Any chronic or recurring diarrhœa will benefit by removal of the appendix. Alternating attacks of constipation and diarrhœa are very suspicious. Flatulence occurring soon after meals, with morning headache, lassitude, and irritability, are indications of increased toxicity of intestinal bacteria. These toxæmic patients generally describe themselves as having a muddled irresponsible feeling in the head, with a loss of memory and of confidence in themselves for business. The facial expression and colour are very suggestive in all cases of intestinal toxæmia.

If these or other symptoms of toxæmia present themselves with no apparent explanation, the retro-cæcal appendix must be borne in mind. An arthritis of the small joints, especially those of the fingers, is often one of the early indications of toxæmia, and is most noticeable in the morning. Rheumatic stiffness of the abdominal muscles is very suggestive.

In conclusion, the object of this paper will have been attained, if it draws the attention of the general practitioner to the fact, that peritonitis is only one of many dangers incurred by leaving a diseased appendix inside a patient.

———————>━ ♦ ━<———————

THE VALUE OF EARLY LUMBAR PUNCTURE IN MENINGISM.

By A. SCOTT GILLETT, M.R.C.S., L.R.C.P.

Late Temporary Captain R.A.M.C. ; Surgeon to the Hon. Mrs. Burns Hospital for Officers, Torquay.

THOSE who have come into contact with cases of cerebro-spinal fever must, I feel sure, have been struck with two great facts which stand out above all others in importance. First, the complexity of symptoms, and second, the enormous difference in prognosis which depends entirely on the early or late treatment with serum. Not only has the mortality dropped from about 70 per cent. to 30 per cent. with the introduction of serum-therapy in this disease, but further, this 30 per cent. is halved when the treatment is given within the first 76 hours. Surely these facts alone send out a charge so pregnant with importance that it is the duty of everyone to leave no stone unturned to fulfil that charge. In other words, *early diagnosis is imperative.* Upon that will, in all probability, depend the life of the patient. The typical cases with all the usual signs and symptoms so obviously displayed—for instance, rash, temperature, pulse, stiffness of neck, retraction, opisthotonos, Kernig's sign, eye changes, and the like, following a history of liability to infection—are easy to diagnose. But it is with the atypical forms, which are by no means rare, the other forms of toxic irritation known as " meningism " and the pro-dromal and early stages of even the typical cases, that we find, perhaps too late, the true nature of the lesion, and thus unnecessarily imperil the life of the patient.

A few notes upon 65 adult cases may be of some value in showing the difficulty of diagnosis, and may at the same time, I hope, strengthen the hand ploughing the unknown land of symptomatology in this disease for the first time, and prepare the observer for the innumerable diagnostic pitfalls.

Let the reader for a moment consider the clinical picture which may present itself to him, and notice the remarkable absence of cardinal signs and symptoms during the early stages in this series of cases.

1. *Rash.*—This was absent in 48 out of 65 cases = 75 per cent. In the remaining 17 cases, 10 showed a diffuse scarlatiniform rash, observed between the seventh and twelfth days of disease. Petechial hæmorrhage was apparent in three, one being very profuse. Four cases presented a papular rash within the first five days, the earliest observed being on the first day of disease. Thus the *rash is more*

commonly absent than present. When *present*, it is of varied character; therefore the name spotted fever is not applicable, only misleading, and useless as a diagnostic factor.

2. *Pulse.*—This was extremely variable, no two cases being alike; increased in 58, and keeping about normal (70 to 90) in the remaining seven cases. Features common to all were irregularity and variability, the frequency rarely being as high as the temperature would lead one to expect. An *irregular, quickly variable pulse* is nearly always present when the disease has obtained a firm foothold. The following chart shows clearly this *variability* of the *pulse* and its independence of temperature.

Pulse
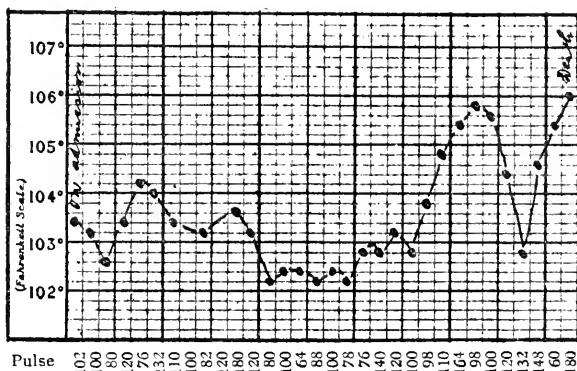
3. *Temperature.*—Here again is a very unstable guide; in the majority of cases (50) it rose suddenly to a height varying from 101° to 105°. In 11 cases the rise was more gradual, taking from 8 to 16 hours to register above 100°, and four cases were entirely afebrile.

4. *Headache.*—Always present, but only in 23 cases was it definitely allocated to the occipital region, the remainder showing a general ache all over the head of a severe and, in a few cases, unbearable nature.

5. *General appearances.*—In the majority of patients these were typical : a flushed face of a slightly dusky tinge, and what is best described as an extremely worried and anxious expression, coupled with dullness and apathy. General *malaise* and, in a few cases, a very definite naso-pharyngeal catarrh, such as precedes measles.

6. *Vomiting.*—This was absent in 32 cases = 50 per cent.

7. *Herpes.*—When present, this was always affecting the lips, but 52 cases showed no sign at all of this affection = approximately 82 per cent. These two signs (vomiting and herpes) present a remarkable divergence from what one is led to expect; thus Ker[1] writes of the former as " *an outstanding feature of invasion,*" and of the latter in the following words : " Herpes, especially of the lips, is much more common and is a valuable aid to diagnosis."

8. *Eye changes.*—(a) *The pupils.* Two main features were noticed in all cases as being constant :—(i) Dilatation—generally equal,

sometimes unequal ; (ii) Reaction to light—always sluggish.

> (b) *Strabismus*—absent in 56 cases.
> (c) *Nystagmus*—absent in 50 cases.
> (d) *Ptosis*—absent in 55 cases.
> (e) *Conjunctivitis*—absent in 55 cases.
> (f) *Suppurative choroiditis*—present in 3 cases.

9. *Reflexes.*—(a) *Knee jerks*—absent in 16 cases.

> (b) *Babinsky*—present in 23 cases.
> (c) *Abdominal reflexes*—absent from the first in 56 cases.
> In this connection it is to be noted that absence of
> knee jerks and presence of Babinsky may not be
> elicited until after the second or third day of disease.

10. *Blood changes.*—A leucocytosis was present in all cases, as in other infective diseases, and therefore only useful as an aid to differential diagnosis with enteric. The counts varied from 28,000 to 32,000.

11. *Stiffness of neck.*—Here at last is a sign which, in the small experience gained by observation in this series, is of the utmost value, the importance of which, I am apt to think, is frequently overlooked. If present in a very slight degree, it may be accounted for as simply part of the " pains all over " of the influenzal victim.   In no single case was the stiffness absent, varying naturally in amount from the severe type—giving later the true retraction of the head and perhaps opisthonotos—to the milder cases with comparatively slight stiffness, *increased when the head is flexed.*   Definite retraction was observed in 42 cases, but it was not a decided feature until a date varying from two to five days after the onset of the disease.

12. *Kernig's sign.*—This, too, was almost equally constant, there being only three cases in which it was not present from the first.   The sign was bilateral in 58 out of the 65 cases.

These details make it quite evident that, apart from stiffness of the neck, we have no data whatever that can, in the early stages, justify dogmatic diagnosis. Thus a more constant clinical aid must be sought   This we have in *lumbar puncture*, and its resulting bacteriological investigation.   Therefore since, apart from examination of the fluid, the signs and symptoms are so complex, of so little value, and of so fickle a nature, can it be regarded with any surprise that, of the 65 cases, only eight were diagnosed for admission as suspected C.S.F., and of the remaining 57 no less than 22 were enveloped in the cloak of subterfuge and dubbed " Influenza."

Five were admitted as measles, whilst the last thirty had more honest recorders, and were christened " Not yet diagnosed " or " Pyrexia of unknown origin."

The essence of the whole matter is this : early signs and symptoms form a very slender reed on which to lean and wait.   At the time when the cardinal signs appear and a state of meningism is apparent, a diagnostic lumbar puncture is nowadays always performed ; but

since these cardinal signs are very often not present until after the
third or fourth day, and since it is of paramount importance to get
a diagnostic suspicion confirmed, or to stimulate the genesis of a
suspicion as soon as possible, *lumbar puncture should be performed at
the earliest moment* and not, as is often the case, only when the
condition has become markedly indicative of meningeal irritation.
It can do no possible harm; and, on the other hand, the value of
such a procedure is incalculable. I would suggest that this course
be adopted more frequently in patients presenting a fever of uncertain
origin, manifesting the general appearance and condition as noted
above. It is of interest to note in this connection that Horder and
Gow[2] draw attention to the fact of the absence of clinical signs for
some days or even weeks. I cannot do better than to quote their
final paragraph :—

> " A persistent headache with pains in the back and limbs,
> and progressive loss of flesh accompanied by a leucocytosis,
> should lead to a lumbar puncture and search for the meningo-
> coccus."

One of the earliest cases which came under the writer's observa-
tion was, to all intents and purposes, a typical case of what we are
pleased to term " influenza." This rapidly developed into a true
C.S.M., and the fluid withdrawn by lumbar puncture was purulent.
This made such an impression that earlier examination of the fluid
was always made with excellent results

DIFFERENTIAL DIAGNOSIS.

The most likely condition necessitating differentiation, and the
only one upon which it is necessary to touch, is that of true acute
nfluenza. In this we have a condition which, in the early stage of
invasion, gives a complete analogy to the severer disease. When
the condition is such that it causes the observer, however careless
his observation, to pick his case temporarily at any rate out of the
diagnostic rubbish-heap of " influenza " for reconsideration and re-
examination, then there is no great difficulty in his coming to a true
conclusion upon the cause of the malady, provided he accepts the
help of lumbar puncture and careful blood examination. The stage
of invasion, however, presents the greatest difficulty in differential
diagnosis, and one which calls for acute and most careful observation
both clinically and in the laboratory.

The *history* may be the same in both cases. A sudden onset,
accompanied by pains and all the attendant discomforts of general
malaise when, even one or two hours previously, the patient felt and
looked perfectly well.

The *temperature*, again, presents nothing of any great help, as
indicated above.

On the other hand, the *pulse* will, perhaps, generate a suspicion
that results in further investigation, for it is very rare to find such
a variable and irregular pulse in influenza, however acute the onset.
Particular stress should be laid upon the *variability*, as indicated in

the above charts.

Thus the condition contains no peg upon which to hang a specific label. The question naturally arises : " Are all patients displaying signs and symptoms of toxæmia to be subjected to a lumbar puncture ? " Of course not ; in cases in which some definite physical signs are found, diagnosis is easy. In other cases, then, are there any signs or symptoms which ought to demand the help of a lumbar puncture ? Undoubtedly there are.

The pulse has already been discussed, and appears to be valuable in conjunction with other signs. The most important, and the one sign which stood the writer in good stead, was the *stiffness of the neck*. The importance of testing this stiffness by *repeatedly* flexing the head on the chest cannot, I think, be over-estimated. I have never seen a condition produced by any toxic agent in which the pain and stiffness *increased* with continuous or repeated attempts to produce this flexion.

In other words, it comes to this : If a patient is struck down suddenly with, or develops slowly some toxic irritation not to be accounted for by physical signs, a most careful investigation of all minor signs and symptoms should be made, especially as regards muscular pain in the back and cervical region. Further, a sample of blood should be taken and bacteriologically investigated, the examination including a Widal test. If the result is negative, it should promptly be followed by a diagnostic lumbar puncture.

The course always adopted after this was that, unless the fluid withdrawn was absolutely clear and under no pressure, an intraspinal injection of the serum was given as a matter of routine at the time of the withdrawal of the fluid upon purely empyrical grounds, pending the result of the bacteriological examination. This may quite rightly call forth the question : " Do the results justify this early lumbar puncture ? " I venture to think they do. Of 55 cases, only six proved fatal, roughly 10 per cent. ; the previous 10 had been seen before the uncertainty of early signs and symptoms was realized, and cardinal signs were awaited with inevitable disappointment. These results may appear to be exceptional, and thus a brief outline of the course of treatment adopted is perhaps permissible.

TREATMENT.

1. *Serum.*—For the sake of clearness, the procedure may be divided into two stages :—

(a) *Early stage*. As already stated, unless the fluid withdrawn was absolutely clear and obviously under no pressure, and if the blood examination was negative, serum was injected. The amount given was 40 cc. 12 hours later 20 cc. were injected, all injections referred to being given intraspinally. This was followed, if necessary, by three more injections of 30 cc. at intervals of 24 hours. It will be understood that the latter part of this treatment was not carried out, if the report from the laboratory failed to show the presence of the meningococcus.

(b) *Later stage*. Here must be considered those cases in which

a positive report was received. The number and frequency of the injections vary, naturally, with the progress of the patient and the disease. In some cases it is necessary to give many more injections at intervals varying from 12 to 24 hours; in others, doses with two or three day intervals may suffice. The question can only be decided by careful clinical observation aided by commonsense. In all cases the dose used was 30 cc. In the severest forms the serum was also frequently given subcutaneously, 12 cc. being infused in all cases, either at the same time as, or between, the intraspinal injections.

2. *General.*—The foot of the bed was raised before lumbar puncture was performed, care being taken that the complete treatment for possible shock was at hand. A careful examination of the patient was made at short intervals.

3. *Medicinal.*—This varied in each case, and depended upon the severity of the attack. The bromides were employed frequently and found useful. Hexamine, 20 grains, thrice daily, was given in practically all cases, and appeared to be beneficial. Large doses as above are, in the opinion of the writer, essential, the full value of the drug being lost if the smaller 5 or 10 grain doses are given.

4. *Local.*—Cervical pain was usually considerably ameliorated by hot stupes. Joints, if necessary, were wrapped in cotton wool or some form of heat applied.

There can be little doubt that the above-mentioned results were due to two factors :—

1. An *early* intraspinal injection of serum pending the laboratory report.
2. Repeated injections within 24 hours.

In conclusion, a word as regards the question of an anæsthetic before performing lumbar puncture. Writers of experience and weight are at variance, and consequently their advice differs. The question is an easy one to settle in patients who are comatose. In cases with decided arching, too, the desirability of an anæsthetic is obvious; but a point which is rather apt to escape the attention it deserves, on account of the technical and clinical interest which absorbs the observer, is the value of light anæsthesia in prohibiting pain and discomfort to the patient, besides easing the sickness which is so markedly present in some cases. Here again is a procedure which can only do good and, what is far more important, ease the unfortunate victim.

Should these few notes result in a more careful observation on the part of others during the stage of invasion in this disease, resulting in an earlier call upon our most valuable and reliable ally, lumbar puncture, then indeed will the writer's object have been achieved.

REFERENCES.

[1] C. B. Ker : *Practitioners' Encyclopedia of Medicine and Surgery*, p. 87.

[2] T. J. Horder and A. E. Gow : *Practitioners' Encyclopedia of Medicine and Surgery*, p. 443.

AN INTERESTING CASE OF MEASLES—WHOOPING-COUGH —PNEUMONIA—PNEUMO-THORAX. RECOVERY.

By SIDNEY MATTHEWS, M.R.C.S., L.R.C.P.

Crawley, Sussex.

Peggy P., aged 7, became ill with measles January 1, 1918. Apparently well and downstairs on January 20.

January 26.—Bronchial catarrh. In bed again.

January 31.—Well-marked whoop. Continued in bed. Not so wel February 7.

February 10.—Developed broncho-pneumonia, especially pronounced in the lower part of both lungs at the back of the chest.

February 14.—Temp. 106°. Child naturally very ill. Gradually began to improve with falling temperature until February 21, when temperature began to rise again to 104°. Then steadily improved until March 1, when whoop became again well-marked.

March 7.—Not so well. Temp. 103°.

March 10.—Sudden access of pain (after coughing) in the left lower back of chest. Examination revealed hyper-resonance over the lower half of left chest back and front, some hyper-resonance in right lower back of chest.

March 11.—Apex beat in axillary line on right side. Pulse 160. Resp. 80. Temp. 101°. Classical signs of left pneumo-thorax. Left side enlarged and immobile. Metallic echo—bruit d'airain, etc.

March 14.—Colonel Hobhouse kindly came from Brighton and saw the child, confirming the diagnosis of pneumo-thorax. Recommended continuance of treatment.

March 16.—Heart apparently failing ; small dose of strychnine given hypodermically, and continued with oxygen. Gradual improvement followed. Warm weather March 22. Child carried down and laid in garden.

March 31.—Started solid food. Still some hyper-resonance left back, heart coming back to middle line.

April 14.—Physical signs disappeared. Apex normal position. Child sitting up.

April 20.—Child able to walk.

May 1.—Went to Eastbourne, and in a few days running about on the sands

Interesting points are the negative T.B. test of sputum, the extremely high temperature in the attack of pneumonia, the apparent sudden rupture of some air vesicles due to the violence of a whoop in a lung damaged by pneumonia, the very rapid and complete displacement of the heart by the large amount of free air in the pleural cavity, and the complete recovery of the lung without at any time any sign of pleural effusion, which is supposed to be the method by which tears in the lung are hermetically sealed and by which recovery takes place.

The treatment consisted mainly in keeping up the child's strength and unlimited exhibition of oxygen,

Practical Notes.

TREATMENT OF SOFT SORES AND BUBOES.

For the last two years Goubeau has had excellent results in the treatment of soft sores and buboes by the local application of arseniate of soda to the former and by injections into the latter whether suppurating or not.

In the case of sores, these are first cleansed carefully and thoroughly with small swabs soaked in ether, until no pus remains in the crevices. The whole surface is then painted over by means of a small soft brush or a small swab with an emulsion of arseniate of soda in absolute alcohol (1 in 50). The alcohol is allowed to evaporate, which can be hastened by pumping a current of air on to it, or blowing through a small tube, leaving a fine coating of the arseniate on the surface. The jet of air will carry this into the crevices. A second application is made directly afterwards, and when this has dried the sores are covered with a little aseptic gauze.

For the ordinary chancroids, Goubeau makes one application each day, but in the case of those exposed to soiling by urine or fæces, he advises that two should be made, preceded by the careful cleansing with ether. As a rule in simple cases only, four or five daily applications are needed to change each of the sores into a small wound, healthy-looking, red, and smooth, which tends to heal up quickly. The application of the arseniate should, however, be kept on with until all traces of pus have disappeared, when it can be replaced by iodoform.

In the case of buboes, which have not become suppurative, he injects into the swollen gland 1 or 2 cc. of a 1 per cent. aqueous solution of the arseniate. This is repeated, if necessary, every second day. When pus is present, this is emptied out by means of a small trocar, and then an injection of 2 cc. of the 1 per cent. solution is made. The puncture and injection are repeated every day or every other day, as found necessary.

In the case of an open bubo, the cavity is cleansed with ether in the same way as the sore, the alcoholic emulsion is applied, and a sterilized gauze dressing applied. Latterly, Goubeau has made use of an emulsion formed by mixing equal parts of ether and the watery solution of the arseniate, and has found that the length of treatment has been shortened appreciably.

The average length of treatment of simple sores and of non-suppurative buboes has been 18 days for suppurating buboes and open buboes 27 days, and for sores under the prepuce with phimosis and needing circumcision 29 days. Some of his cases treated successfully in this way had already been under treatment by other methods for weeks and even months previously.— (*Journ. de Méd. et de Chir. prat.*, April 10, 1918.)

A SOLVENT FOR PLUGS OF WAX, ETC., IN THE EAR.

Cronzel recommends the following for dissolving the accumulations of cerumen, epidermis, and so forth in the external ear :—

Solution of ammonia	-	-	-	-	1 part.
Poppy oil, sterilized,					
Sulphuric ether -	-	-	- of each	9 parts.
Eucalyptol	-	-	-	-	1 part.

The oil and the ammonia are shaken together in a flask for ten minutes to produce an ammoniacal soap in the excess of oil. The mixture is warmed slightly in a *bain-marie* to expel the free ammonia. After cooling the ether and eucalyptol are added, and the mixture is well shaken up to obtain a

homogeneous result. This shaking must be repeated at each time of usage.

A small pledget of absorbent wool is soaked in the mixture and introduced into the ear. Pressure on the tragus with the index finger causes the fluid to run into the canal and forces the pledget out. This is done two or three times a day, and in a few days the liquefied plug is easily removed.—(*Journ. de Méd. et de Chir. prat.*, April 10, 1918.)

TREATMENT OF SEPTICÆMIA BY INTRAVENOUS INJECTIONS OF SUGAR-SERUM.

Audain and Masmonteil have established the fact that injections o an isotonic solution of sugar intravenously in the case of shock have a remarkable effect in promoting leucocytosis. They found that a count of from 5,000 to 7,000 before the injection was increased to over 25,000 in less than half-an-hour after it, and remained for two or three hours before falling to about 16,000. Clinically, this effect is shown by a rise of temperature for some tenths of a degree, which is ushered in by a rigor and followed by a profuse sweat. This increased leucocytosis is an important reinforcement to the organism in its struggle against the microbial invasion. In addition, the introduction of an assimilable nutrient like sugar is a matter of moment in these cases, in view of the anorexia associated with the condition. The diuretic effect of sugar is a further advantage. The injections, therefore, offer a combination of leucogenetic, nutritive, diuretic, and stimulant actions, all very necessary for the successful treatment of septicæmia. The use of an isotonic solution avoids all risk of hæmolysis.

Intravenous injection is essential, because no leucogenetic action follows subcutaneous injections. Glucose, saccharose, or lactose may be used, but an isotonic solution is necessary, in the proportion of 47·60 of glucose, 103·50 of saccharose, and 108·90 of lactose in 1,000. A fresh case requires from 300 to 500 cc. to bring about the leucogenetic reaction. In a patient who has already received injections, and in the case of grave septicæmia, there should be no hesitation in giving 1,000, 1,500, or even 2,000 cc. a day in two or three doses. The necessary amount is easily and accurately determined by taking frequent counts of the leucocytes. A total of about 25,000 must be aimed at. Practically, this is manifested by the occurrence of a severe rigor within an hour after the injection has been given. The treatment should be continued until the temperature has been consistently normal for four or five days. The pulse regains its normal rate, diuresis s completely reestablished, and sometimes, in different parts of the body painless abscesses appear, containing thick, sterile pus.—(*Journ. de Méd et de Chir. prat.*, April 25, 1918.)

PARAFFIN AND GUTTA-PERCHA DRESSING FOR WOUNDS AND BURNS.

Madame Bonet-Henry reported to the Academy, as the result of many experiments, that paraffin, hard or liquid, is best applied to the tissues at a very high temperature, provided it is combined with an isolating substance, the best being gutta-percha. The mixture cools down very much more slowly than a hot fomentation, and can be applied without burning at a temperature varying between 70° and 90° C. The dressing is painless and supple, and keeps up compression by reason of its elasticity.

All fatty bodies can be rendered more or less isolating, but the plastic and anhydrous properties of paraffin make it the ideal vehicle for gutta-percha. The paraffin must have a melting-point of between 42° and 45°. The proportions used are 50 of gutta-percha and 1,000 of paraffin.—(*Journ. de Méd. et de Chir. prat.*, February 10, 1918.)

Reviews of Books.

Symptoms and their Interpretation. By Sir JAMES MACKENZIE, M.D.,
F.R.S., etc. Pp. 318. London : Shaw and Sons. 8s. 6d. net.

THIS volume is an eminently practical one, chiefly by indicating the
nervous connection between the skin and deeper structures and the value of
the recognition of this association in diagnosis. We are at once reminded of
the classical lectures on " Rest and Pain," delivered by John Hilton at the
R.C.S. in 1880–81–82, and published later, to which careful observer, among
others, our author acknowledges his obligation. Hilton (p. 234) indicates
the various parts of the thoracic surface where pain and tenderness are
associated with inflammation of the serous membrane beneath through
nervous connection. Sir James, however, not only shows the " mechanism
by which pain is produced," but throws a new light on the subjects of
hyperæsthesia and the viscero-motor reflex. The extension of stimulation
of one nerve centre to another by contiguity offers valuable assistance to
the clinician in the interpretation of symptoms otherwise obscure. The
significance of areas of hyperæsthesia in localizing sites of disease is pointed
out in the cases of bowel obstruction, gallstone, renal calculus, and affections
of the pulmonary and circulatory organs. The illustrations in the text
will impress this on the reader's memory. We have read the book with
pleasure, and recommend its careful study to those who desire to practise
their profession in the light of modern knowledge.

Glaucoma. By ROBERT HENRY ELLIOT, Lieut.-Colonel I.M.S. (retired).
London : H. K. Lewis & Co., Ltd. Price 21s.

ELLIOT's monograph on Glaucoma, which represents much labour and
is written with remarkable clearness, should be read by every ophthalmic
surgeon. It is insisted upon that the word " glaucoma " represents a con-
venient label for a group of pathological conditions, which have in common
a rise in intra-ocular pressure, upon which every sign and symptom of the
disease depends. Elliot is emphatic upon the point that the glaucomatous
process, however different it may appear clinically, is at root one and the
same. As regards the relationship of systematic blood-pressure to intra-
ocular pressure it may be said, broadly speaking, that the two rise and fall
together. It would be a mistake, however, to suppose that the latter
exactly follows the variations of the former. It is only by giving due
weight to this point that we are able to reconcile the contradictory results
obtained experimentally. The important conclusion is reached that the
high blood-pressure of general arterio-sclerosis is emphatically not a factor
in the causation of glaucoma. The author gives considerable prominence to
the pump-action, described by Professor Arthur Thomson, of Oxford, as a
factor in the transference of fluid from the anterior chamber into the canal
of Schlemm and the iris veins during the waking hours.

Elliot describes a novel perimetric sign of glaucoma, which may be a
development of Seidel's well-known sign. The sign now described by Elliot
may prove to possess considerable diagnostic value, but in order to find it
the visual field must be searched with care. Speaking of the Schiötz tono-
meter the writer says that " the feeling of those who work with it is that one
might just as well guess a patient's temperature by passing a hand over his
skin as attempt to estimate his ocular tension by the digital method alone."

The way of applying the instrument is carefully described, and Elliot holds that one application should usually suffice. He agrees with Priestley Smith in thinking that the actual reading of the instrument should be recorded and not the supposed equivalent mm. of mercury.

In regard to the medical treatment of glaucoma the various means are discussed, special stress being placed upon the employment of miotics and of various kinds of massage, and de Wecker's aphorism is quoted, " If miotics have never cured a case of glaucoma they have prevented many glaucomatous patients from being cured." If despite medical measures the disease progresses, Elliot is convinced that we should resort without further delay to surgical means for the production of a fistulous scar. After pointing to the various ways in which iridectomy reduces the tension of a glaucomatous eye Elliot makes the point that in the newer operations we are dealing with an entirely different set of conditions, inasmuch as the aim is not to reopen old physiological channels but to form a new and vicarious escape for the aqueous humour. In those operations, he thinks, there can " be no question that a fistula can be established long after the time is past when an iridectomy would be of any avail."

In bringing this brief notice to an end we congratulate the author upon having produced a noteworthy book, in which he discusses the manifold problems of glaucoma in a broad-minded and scientific spirit. It marks an epoch in the history of glaucoma.

Technic of the Carrel Method. By J. DUMAS and ANNE CARREL. Translated by A. V. S. Lambert, M.D., with an introduction by W. W. Keen, M.D. Pp. 90. New York : P. B. Hoeber. $1.25 net.

THIS little book gives a very clear account of the mode of application of the Carrel-Dakin treatment of wounds and details of the apparatus employed. It has been written primarily for the information of nurses, though the busy practitioner will find it useful, and it is not intended to supplant the more complete account written by Dr. Carrel (*Treatment of Infected Wounds*) already reviewed in THE PRACTITIONER. Several plates illustrate the details of the apparatus.

Very full instructions are given in an appendix for the preparation of Dakin's solution, but here a very serious blunder mars the text; this is the substitution throughout of " calcium chloride " for what should be " chloride of lime." These two substances are totally different, and if the former (calcium chloride) is used for preparing Dakin's solution, the solution would be inert and disaster might follow its use. No time should be lost in correcting so vital an error. Directions are given for the microscopical examination of wounds by Carrel's method, and a glossary of English and French terms and tables of weights and measures complete the book.

Anti-Malarial Work in Macedonia. By W. G. WILLOUGHBY, M.D., and L. CASSIDY, M.B. Pp. x and 58. London : H. K. Lewis & Co. 3s. 6d. net.

THIS little book gives an excellent account of the prevalence of malaria, and of the anti-malarial measures organised, among the British troops in Macedonia. The country is abundantly supplied with watercourses, lakes, ponds, marshes, and puddles, which form excellent breeding places for mosquitoes. Methods of dealing with some of the collections of water are described and the use of nets, repellents and other means of warding off mosquitoes are detailed. Quinine prophylaxis is not considered to be very serviceable. A feature of the book is the number of plates illustrating the features of the country and breeding places of mosquitoes, tents, nets, etc.

Preparations, Inventions, etc.

This splint consists of—(A) Internal flange of duralumin attached to a metal tube, which extends below the knee; (B) External flange with same fitting; (C) Footpiece, with notched round bars, which telescope into A and B; (D) Spring catches and spring lock rings; (E) Ankle extension spat, and supporting webbing straps ; (F) Footrest; (G) Pelvic band, for fractures of the middle and upper third of the femur.

A is the counter-extension piece, and is moulded to fit the thigh, tuber ischii and gluteal fold. It is connected to B by two buckles and straps in front and behind. The straps can be altered to fit the circumference of any thigh. Either flange can be altered to fit the shape of the patient exactly, by wrenches or even by the fingers. By an arrangement of notches on the upper end of the rods of C, and spring catches on the lower end of A and B, the splint can be adjusted in length as required for an adult from 5 ft. 4 in. to 6 ft. 4 in. in height. It can also be packed in a smaller compass than any other splint in use at the present time.

By using the splint, numerous contrivances, such as overhead bars, pulleys and weight extension, are dispensed with, and as soon as the nature of the wounds allow the patient to get up, he can be made to walk with comparative ease, in a simple fracture even, within four days after the injury.

A layer of wool is wrapped around the ankle and upper part of the foot with the loop, in the middle of the leather above and in front, the two indentations on the sides opposite the malleoli, and about ¾ in. above them. The flap with the buckle is passed around the outer side of the ankle to the i ner side; the flap with the strap being passed in the opposite direction, the buckle is slipped through the slot in the leather. Strap and buckle should then be pulled tight and held fast with the fingers at the back and thumb in front, and fastened on to the buckle on the inside. A pull downwards on the strap and buckle underneath will bring the extension anklet into position. The metal flanges should be fastened each one over a Dakin pad to fit the thigh closely, taking care that 3 in. of space is left between the os pubis and the inside metal rim of the internal flange. If the angle of the metal flanges is not quite correct, the splint can be bent at the junction of the tube and metal flange to correspond with the conica shape of the thigh. The spring catches are raised with the wedge-shaped groove of the spring lock rings, and the notched bars of the footpiece are inserted in the tubing, and pushed upwards to the sole of the foot. The strap on the outside of the ankle spat is inserted underneath in the slots of the footpiece, the heel drawn closely on to the footpiece and strap and buckle fastened on the inner side. The spring lock rings are now removed so that the spring catch can act.

Extension is produced by pulling the flanges upwards, and the foot which is attached with the ankle spat to the footpiece downwards. The spring catches at the junction of the notched bars and tubing will allow for and maintain the necessary amount of extension. The spring lock rings can be pulled over the spring catches so as to make them unmovable when enough extension has been obtained. To release the extension, the spring catches are lifted by means of the wedge-shaped groove in the spring lock rings.

We have seen this splint used, and are very pleased with the results.

THE PRACTITIONER.

AUGUST, 1918.

❖◦❖

TOOTH IMPACTED IN A SECONDARY BRONCHUS OF THE LEFT LUNG; REMOVAL BY LOWER BRONCHOSCOPY, AFTER TWO UNSUCCESSFUL ATTEMPTS BY UPPER BRONCHOSCOPY.*

By Sir StCLAIR THOMSON,
M.D., F.R.C.P., F.R.C.S.

*Professor of Laryngology in King's College Hospital,
London.*

[With Plate III.]

THE complete history of a single case, which is full of incidents, is sometimes of more value than a whole series of records of uneventful operations. The heading of this paper indicates its chief point of interest, but the tale I now unfold has many others which concern the laryngologist, the dental surgeon, and the family physician.

HISTORY OF ACCIDENT.

On November 20, 1917, a healthy girl, aged 10, of a nervous type, was placed under nitrous oxide anæsthesia for the purpose of removing the two first lower (temporary) molars. The left one was first extracted; the dental surgeon drew it outside the mouth in his forceps and then shook it loose, with the intention of throwing it into the usual porringer beside the dental chair. But he noticed, instead, that the tooth fell on to the napkin, tucked under the child's chin, and was caught there in a fold. Without delay he proceeded to the extraction of the corresponding tooth on the right side; as he turned and threw this away the child, recovering from the anæsthetic, raised both hands (with the napkin above them) towards her mouth, making at the same time a deep inspiratory gasp. The dentist never suspected that at this moment the first tooth must have re-entered the patient's mouth, and no one was more astonished than he was, later on, when he heard the subsequent history.

When the child recovered from the gas, it was remarked that she was slightly wheezy. She returned by train to the country that afternoon, and in the evening the mother, noticing the wheezing, thought that her daughter had a slight cold. A few days later, the family attendant, Dr. Smallwood of Little Waltham, Chelmsford, was called in and found a catarrhal condition with very little air entering the left lung. Wheezing continued, and, in view of a definite family history, it was treated as possible asthma. Some relief was

B

obtained, but no cure.

In view of the one-sided symptoms, Dr. Smallwood made further inquiry, and, on tracing the illness back to the period of the tooth-extraction, he shrewdly suspected that there might be a foreign body in the lung. A consultation with Dr. J. F. W. Still confirmed him in this hypothesis. There was then, a month after the visit to the dentist, a slight wheezing which was audible at a distance of a foot or two from the chest. Rhonchi were heard on both sides, but chiefly over the left lung, with absence of air entry towards the posterior border of the left axilla. There was a short cough.

An X-ray examination by Dr. Ironside Bruce gave the following report :—

" Limited movements of the diaphragm on the left. The left lung showed increased translucency, the diaphragm remaining in a position of almost full inspiration. There is to be seen an opacity in the region of the root of the left lung, it possesses rather an indefinite outline, and is roughly rectangular in shape. The left lung shows increased translucency as compared with the right, and the left diaphragm lies at a much lower level in the thorax than the right."

Dr. Bruce's opinion on the finding was as follows :—

" On account of the history of a possible foreign body in the bronchus the opacity reported above, which lies in a position corresponding to the left bronchus, might well represent a tooth. But, on the other hand, it may represent a calcified root gland, though it should be noted, that its size, shape and position is not such as might be expected from such a gland."

This X-ray examination was confirmed by another by Mr. A. D. Reid.

FIRST EXAMINATION.

On December 28, 1917, I started to attempt removal by direct bronchoscopy through the mouth. Bromide was given for three days beforehand to diminish reflex. Chloroform was administered by Mr. Bellamy Gardner, and I was assisted by Dr. Irwin Moore.

I found the build of the patient showed narrow and long air passages, allowing only the use of a Brüning's 7 *m.m.* tube. Reflex cough was diminished, as I passed the tube down the trachea, by the application of cocaine to the larynx and to the carina—which is the next most sensitive spot. I had to be moderate in the use of cocaine (a $2\frac{1}{2}$ per cent. solution) owing to the age of the patient. After much searching the white glistening tooth was seen, tightly impacted in an externo-lateral secondary branch of the left bronchus, at a depth of $10\frac{1}{2}$ inches from the teeth. (Plate III., Fig. 1.) All my efforts to grasp it with various instruments failed. The narrowness of the bronchiole prevented a wide opening of any nippers, and the polished, smooth, ivory surface of the tooth gave no hold. I then made use of a long probe with a hook at the end, and insinuated it between the tooth and the bronchial wall, with the hope of either extracting the tooth or turning it round. The hook was passed beyond the tooth, but all efforts to extract the tooth failed; what was worse, the hook appeared to catch in some other bifurcation close behind

the tooth, and I found that I could extract neither the tooth nor the hook! I had forgotten Chevalier Jackson's warning that " hooks with a curve greater than a right angle are very apt to become engaged in small orifices and to be very difficult in removal " (p. 272, *op. cit.*). After some anxious five or ten minutes I succeeded in disengaging the hook with only slight traumatism.

The tooth remained in position.

The patient had now been under chloroform for 1 hour 45 minutes, so I decided to abandon the attempt that day.

DIFFICULTIES.

In his classical work on *Peroral Endoscopy and Laryngeal Surgery* (St. Louis, Mo. 1915, p. 289) Professor Chevalier Jackson, of Philadelphia, has the following paragraph : " One of the most difficult mechanical problems is where a foreign body that completely occludes a bronchus into which it is tightly drawn by the absorption of air below, and that in addition has a conoidal form towards the operator. The problem is difficult, especially if the intruder is hard and smooth, because the forceps cannot get a large surface of contact and hence slip." I was evidently, in American parlance, " up against " an even more difficult proposition, for not only had I to do with a smooth, ivory, conoidal surface, but with a foreign body which was tightly impacted, not in a main bronchus but in a secondary bronchus. To this point it must have been straightway drawn with that first deep inspiration as the child recovered from the anæsthetic, for it is noteworthy that, from that moment, there had been no attacks of spasm or violent coughing such as there would have been if the tooth had at any time been loose in the trachea or large bronchi. Moreover, the tooth had been fixed in this bronchiole for five weeks—time enough to allow of all the air beyond being absorbed and the tooth becoming more tightly impacted.

For those who do not know his work, I might say that, in matters of endoscopy, Chevalier Jackson is *il maestro di loro che sanno*, and that we are all willing and eager to learn from his great skill and large experience. I have little doubt that he has removed more foreign bodies from the food and air passages than any other single laryngologist in the world. He has been able to gain this position by specializing in this line, and by having all North America as a field of practice. Anyhow, after the first failure I turned to his writings and there read this dictum (p. 258) : "Any intruder that has gone down through the glottis can be brought up the same way, if turned to the position of least resistance." I was not sure of being able to turn the tooth, but I determined to make a second attempt at peroral extraction.

From the first examination my little patient had no shock or upset. She slept well and swallowed easily; the temperature did not rise above 99°; and within a few days she was out walking. An X-ray photo by Dr. Ironside Bruce showed the tooth still present

in a left secondary bronchus, and even deeper in the lung.

SECOND EXAMINATION.

Eight days later, on January 5, 1918, chloroform was again given. There was much more reflex cough and secretion of mucus this time; the tooth was discovered more deeply; less of it was visible, owing to swelling of the mucosa. I found it very difficult to keep the tooth well in view in the centre of the field of vision owing to the strong traction towards the patient's right side which I had to maintain on the handle of the instrument, in order to direct the beak of it well towards the left axilla. I was about to introduce Dr. Irwin Moore's well-known non-slip forceps when—doubtless owing to the aforesaid traction dragging on the root of the lung or on the heart—the patient suddenly collapsed, and had to be restored by artificial respiration. She had been under the anæsthetic 40 minutes. There was no shock or feverish reaction from this examination, but after these two ordeals I thought it best to let the child go to the country—which she did five days later.

ALTERNATIVES.

What was to be done? Were we to "wait and see," a policy which has gone out of favour in endoscopy as it has in politics? Foreign bodies have been coughed up many a time in days gone by, sometimes after a prolonged stay in the chest. But, unfortunately, statistics do not help us in this, for we never know in what part of the air-tract the intruder had been sojourning, nor how firmly it had been fixed. A large, light, foreign body, mobile in the trachea or a main bronchus, may easily be coughed up; but there is little chance of such a happy expulsion with a small, solid, smooth substance tightly impacted in a secondary bronchus and with all the air on the far side of it absorbed. On the contrary, each deep breath —preliminary to an explosive cough—would only tend to wedge it more deeply.

There was the alternative of the tooth becoming loosened by suppuration taking place around it—almost certain to happen in time —and its being expelled through the mouth with the discharge of the abscess. But, unfortunately, even with such a development there was no certainty that the pus would remain localized and burst towards the main bronchus, nor that it would bring the tooth with it. The pus might just as readily diffuse in the lung and cause sepsis.

I considered the possibility of thoracotomy. The results of this operation are not brilliant. Considerable progress has, I believe, been made during the great European War in removing through the ribs fragments of shells and other missiles which have entered the lungs. But there is a great difference between following the track of a foreign body which has penetrated into the lung through the chest wall, and hunting around from the outside of the thorax for a foreign body which has entered from the glottis and lies at the root of the lung, close behind the pericardium.

While weighing these considerations, I made some investigations

with Dr. Moore on the cadaver, and he further perfected some forceps for securing a good grip.

LUNG ABSCESS DEVELOPS.

Action, however, had soon to be decided on, owing to developments in the case. The patient, as I have narrated, returned to the country after her second anæsthesia on the 10th January last. Dr. Smallwood reported that " there is no wheezing and only occasional slight shortness of breath." There was slight deficiency of air entry in the left axilla, rather toward the posterior fold. The heart's apex was about ¾-in. outside the nipple, probably due to collapse of a portion of the lung and the heart swinging over to take its place. She continued to eat
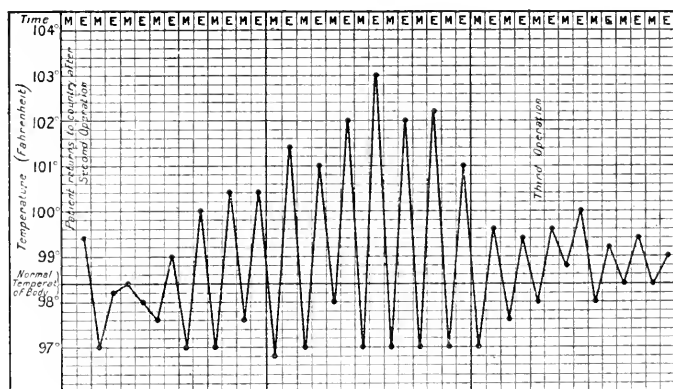
FIG. 2.—*Chart of temperature indicating formation of abscess in lung, beyond the impacted tooth*

and sleep well, in spite of the tooth in the lung, and the temperature was normal. But it soon began to rise (*see* Chart, Fig. 2), until it was oscillating from 97° every morning to 101°, 102° and 103° in the evening. An X-ray by Dr. Ironside Bruce showed the tooth as before, or even deeper, with commencing opacity in the left lung. Abscess formation had evidently taken place and action could not be long delayed.

I was glad to share the responsibility of my third campaign by having a consultation with Dr. Dundas Grant and Mr. E. D. D. Davis. After hearing the history and difficulties of the case, these colleagues were unanimous in strongly recommending that there should be no further attempt at removal by upper bronchoscopy (*i.e.*, through the mouth); that there was no objection to tracheotomy except the slight scar, which I had wished to avoid in a young lady; that tracheotomy would enormously facilitate extraction, and that, in the event of failure to extract the tooth, the patient would be much safer with a tracheotomy tube in her neck if we should be compelled to

await a later chance of spontaneous expulsion.

I readily agreed to this after the experiences I have related, and also because I had already fulfilled one of Chevalier Jackson's rules, which is as follows :—" If the first bronchoscopy is not successful after 15 or 20 minutes in a child, it is better to desist, wait a few days, and repeat the oral bronchoscopy at least twice before resorting to the tracheotomic route " (p. 252).

THIRD EXAMINATION AND SUCCESSFUL REMOVAL.

Next morning, January 26, 1918, chloroform was administered by Mr. Bellamy Gardner. I had given bromide for three days beforehand. Again I was assisted by Dr. Irwin Moore, and also had the valuable help of Dr. Dundas Grant and Mr. E. D. D. Davis. The trachea was quickly exposed without having to tie a single vessel. I injected a $2\frac{1}{2}$ per cent. solution of cocaine, with a little adrenaline, into the lumen of the trachea by stabbing between the rings with a hypodermic needle. This abolished any cough on opening the trachea. Through the tracheotomy wound I was able to pass a 10 *m.m.* Brüning's tube, instead of the narrow 7 *m.m.*, which was all I had been able to introduce through the glottis. I came readily down on the tooth at a distance of less than $5\frac{1}{2}$ ins., instead of the $10\frac{1}{2}$ to $11\frac{1}{2}$ ins. interval by which I was separated from it in the two previous examinations. Any approach of the instrument to the tooth caused reflex barking cough. Some little time was spent, therefore, in cocainizing the region. As this was being done some milky fluid kept oozing upward alongside the tooth. Finally, when a swab produced no reflex on touching the tooth, I took a pair of Killian's " bean forceps" down to the tooth and then dilated them so as to free the tooth and get a good grasp (Plate III., Fig. 3). This must have released the pus pent up behind the tooth, for there was a gush of yellow fluid, and, for the moment, I thought I would be baulked in removal. But, knowing I was in good position, I carefully closed and withdrew the forceps and found the tooth firmly grasped in the middle of them. One or two teaspoonsfuls of yellow pus welled into the left bronchus and were cautiously sponged out, while the head and thorax were lowered in the Trendelenberg position. I left the bronchiole clear, with only a minute granulation in it.

From the beginning of the tracheotomy to the removal of the tooth, the time occupied was exactly 29 minutes. There was no shock or collapse.

Complete Recovery.—The after-history was uneventful. In an effort to avoid all scarring I closed the entire wound in the neck with buried catgut and superficial silkworm and horsehair sutures, but the two or three middle sutures had to be cut away, as there was some cough leading to subcutaneous emphysema, which extended right up to the eyes. One month afterwards the patient went to the seaside, and Dr. Smallwood wrote to me as follows :—" She seems very fit, and the chest is clear as far as I could make out except a little deficiency of air entry in the left lower axilla." The scar in the neck is
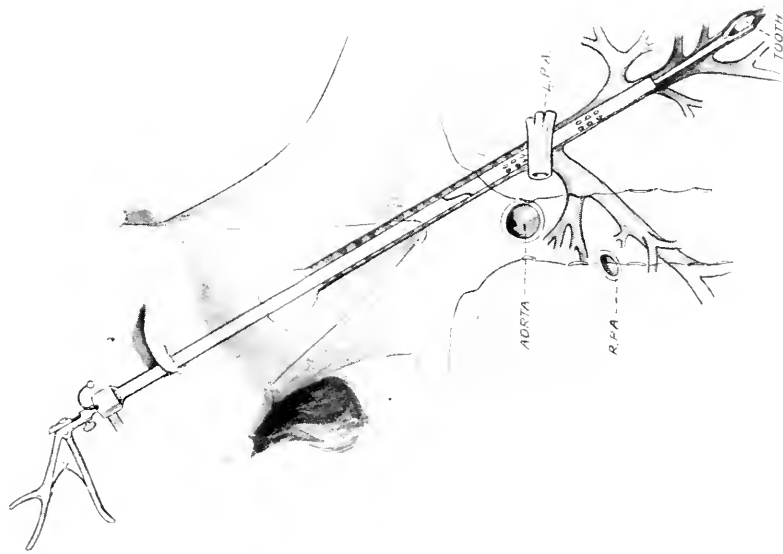
PLATE III

Fig. 1. UPPER OR PER-ORAL BRONCHOSCOPY. Semi-diagrammatic drawing showing how the head and neck have to be flexed to the right so as to allow of the passage of the endoscopic tube into the left bronchus and its divisions. In the drawing, Moore's forceps are seen grasping a tooth in a secondary bronchus, in a position similar to the case described in this paper.

Fig. 3. LOWER OR TRACHEOTOMIC BRONCHOSCOPY. A semi-diagrammatic drawing showing the position of the endoscopic tube when introduced through the tracheotomy wound. The relation of the aortic and pulmonary arteries is also shown. In the drawing, Moore's forceps are seen dilating a secondary bronchus and seizing an impacted tooth as described in the present communication.

(For the loan of these original drawings the author is indebted to his friend Dr. Irwin Moore.)

insignificant.

FOREIGN BODIES LESS FREQUENT IN LEFT LUNG.

I might here remind my readers that it is decidedly rarer to meet with foreign bodies in the left lung than in the right. Statistics agree in this, although the figures show the proportion entering the right bronchus vary from 75·4 per cent. (Gottstein) to 70·2 per cent. (von Eicken) and 62·5 per cent. (Morell Mackenzie). Some of the reasons for this are demonstrated by a reference to Fig. 4 taken from my text-book.[1]   It will be seen that
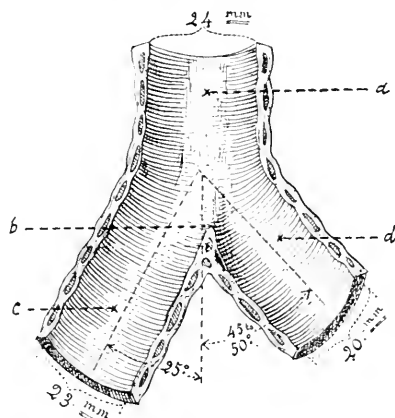
FIG. 4.—*Semi-diagrammatic drawing of a vertical, transverse section of the bifurcation of the trachea, viewed from the front. It will be noticed that the right bronchus is nearly as wide (23 m.m.) as the trachea (24 m.m.), with which it is in a more direct line than with the left.   Hence foreign bodies are more apt to enter the right bronchus, into which they are also directed by the interbronchial ridge (the "carina") which is slightly to the left of the middle line. a. Trachea ; b. interbronchial ridge ; c. right bronchus ; d. left bronchus.*

the diameter of the right bronchus is decidedly larger than the left; indeed, it is very slightly narrower than the trachea itself, with which it is also in a more direct line, owing to the less angle of deviation. There is also a larger volume of air being drawn along the right bronchus. This picture also explains why, while it is rarer for a foreign body to enter the left bronchus it is also—on account of the greater obliquity—much more difficult to get the intruder out !

BIBLIOGRAPHY.

I had not intended attempting a study of the records of the falls of teeth into the lower air passages, but, by pure accident, I came across a communication which is very interesting when compared with my own, whether from the points of diagnosis, method of treatment, or after result. In 1908, Mr. Rutherford Morison read " Notes of a Case in which a Portion of a Lung was Excised " before the Medical Society.[2]   This turned out to be the case of a woman of 36 to whom chloroform was administered while 6 to 8 stumps were extracted.   On recovery she found one tooth lying loose, between the

[1] *Diseases of the Nose and Throat,* 2nd edition.   London : Cassell & Co., 1916, p. 746.

[2] *Transacs. Med. Soc., London,* Vol. XXXII., October 12, 1908, p. 6.

cheek and gum, and spat it out; and at the same time, felt difficulty of breathing and a tightness in her chest, and expressed her own conviction that a " stump had gone down her throat." Three weeks later a long illness started with cough, blood spitting, profuse and fœtid expectoration, and loss of weight and strength. This went on for two years before the diagnosis was made of bronchiectasis limited to the lower part of the left lung caused by " a tooth impacted in a bronchus," although " Roentgen ray examination showed no abnormal shadow." Operation from the outside was attempted by resecting 6 ins. of the eighth rib. A large portion of the lower lobe of the lung was
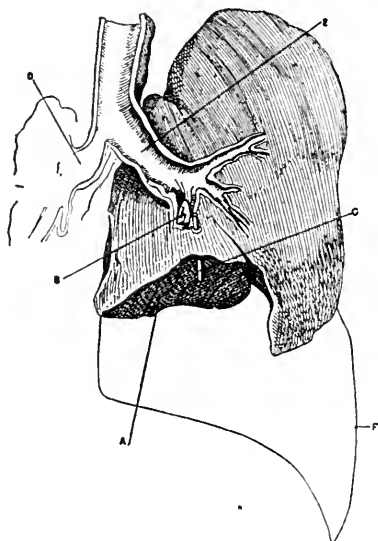
FIG. 5.—A. *Cut and healed surface of lung.* B. *Stump of tooth in bronchus.* C. *Probe from cut surface through open bronchus to tooth.* D. *Right bronchus.* E. *Left bronchus.* F. *Outline of lower part of lung excised.* (From the *Transacs. Med. Soc., London.* Vol. XXXII., October 12, 1908).

removed (*see* Fig. 5). but the patient died 28 days later from pericarditis. The post-mortem showed that the tooth-stump was impacted in a secondary bronchus, and that it had only been missed at the operation by three-quarters of an inch.

At the ensuing debate J. Kingston Fowler referred to a case of a tooth in exactly the same position; a cavity formed in the lung; operation from the outside failed and the patient ultimately died from pulmonary tuberculosis. A. Barker narrated a case of a tooth in a right bronchus leading to gangrene and an empyema. It was decided to attempt removal through the chest wall, but " the first few whiffs of chloroform proved fatal."

The fact that three separate personal cases of a tooth in the lung could be recorded at a meeting of a general medical society would appear to indicate that the accident may not be so rare as one might think. That X-ray examination should have failed to detect the tooth shows how far radiology has progressed in these eight years, and that endoscopy should not have been employed in Mr. Morison's case demonstrates how slowly the knowledge spreads in the profession of the recent rapid progress of laryngology. The

case conveys one other lesson for all of us, and that is, not to disregard a patient's own feelings when he says that he feels something has stuck in the throat or chest.

A recent discussion in America shows that bronchoscopic cases of dental origin are by no means uncommon.[1] Indeed, one speaker suggested the necessity of a detailed method of observation and counting in the extraction of teeth, similar to that provided by the abdominal surgeon in cases of sponges and instruments! This would not entirely cover the ground, for in the above debate the following articles of a dentist's armamentation were mentioned as having been retrieved from the lungs :—teeth, gold crowns, bridges, dental burrs, pieces of rubber, and fragments of plaster of Paris models!

UPPER AND LOWER BRONCHOSCOPY COMPARED.

The comparison of upper and lower bronchoscopy (or the per-oral and tracheostomic routes) calls for some consideration (Plate III., Figs. 1 and 3). In his own last 182 cases, Chevalier Jackson records that the foreign body was found and removed in 177 cases, and that in each instance he did without a tracheotomy (*op. cit.*, p. 246). He is an ardent supporter of this route, as I have already quoted. The above figures show his success, and the safety is demonstrated by his death-rate of 1·7 per cent. He attributes his success largely to the lateral or forward flexions which can be given to the head by a specially trained assistant, so as to extend the angle formed by the trachea and bronchus (the " Boyce position "). But his precepts—or his successes—are not invariably followed. In 1913, he collected a record of 156 foreign bodies removed by various operators in the United States; of these, 22 were extracted through a tracheotomy opening. I have no doubt that Jackson's endorsement of the upper route is well founded, in his case, by his exceptional experience, his completely organized clinic, his permanent and highly trained assistants, and the evolution of " team work " which is well established in America but only beginning to be talked about here. In addition, he has the advantage of being accustomed to work with narrower instruments and without a general anæsthetic. I also agree, as I have already said, that at least two attempts should first be made in most cases to effect extraction by the mouth; and I note that Jackson says that " he regards tracheotomy as perfectly justifiable in any case in which the surgeon in charge deems tracheotomy for any reason whatsoever indicated for the best interests of the patient " (p. 258).

After all, it is the interest of the patient which must settle any question of nicety of an operation. Endoscopy of the air and food passages must always remain in the hands of the expert laryngologist. If he is well experienced and in regular practice, he will first approach such cases as mine through the mouth, and in most cases he will succeed. This is the first, in my practice, in which I have failed since I went to learn the technique at Freiburg in 1902. But in a

[1] B. R. Shurly and others : *Transacs. American Laryngol. Assoc.*, 39*th Meeting*, 1917, p. 102.

certain number of cases, particularly the rarer and more difficult ones which occur in the left lung, the lower route, through a tracheal opening, is in the interest of the patient. It will also be the route taken more readily by those who are less experienced, for it enables the surgeon more promptly to live up to the old adage that he should cure his patient " *tuto, cito et jucunde.*" In the present case there was hardly any room for comparison between the difficulties and anxieties of the two per-oral interventions and the facility, simplicity, safety and promptness which were obtained by operating through a tracheotomy orifice (Plate III., Fig. 3). To be brief, the advantages of the better route can be summarized as follows : (1) Less anxiety with the anæsthetic, for we all know the administration through a tracheotomy opening avoids all pharyngeal and laryngeal reflexes and is therefore much smoother and safer; (2) Ability to succeed without several trained assistants, because there is no longer the necessity to mobilize the head; (3) The use of a wider and shorter tube, thus obtaining (4) better illumination, (5) a larger field of vision, and (6) increased facility of manipulation; (7) Less leverage and traction on the important structures at the root of the lung; (8) Shorter sitting; (9) Greater certainty in result; (10) In the event of failure, or of the foreign body shifting its position during the séance, the tracheotomy is a decided security. I must add that in my case the abscess formation had loosened the impaction of the tooth and so mitigated one of my difficulties before the third intervention.

In comparison with the advantages, what are the drawbacks of a tracheotomy ? Except for the trifling scar—of no importance to any individual compared with a risk to life, and only valued by young ladies who have to go *décolletées* to Court, and are not yet possessed of a diamond dog-collar !—I know of none. The death-rate from a preventive tracheotomy should be nil; it is the circumstances of a tracheotomy done for relief, or the results of a delayed tracheotomy, which cause disaster. In the present case, it was the adoption of the tracheotomy route which saved the child's life. I think lower bronchoscopy will therefore be the necessary method in certain circumstances, or when foreign bodies are tightly impacted, or when they have receded to the deepest corners of the airway, and particularly in the greater difficulties presented by their entry into the left chest.

In these views I am glad to find myself in accord with D. R. Paterson (Cardiff), who has twice adopted lower bronchoscopy in young children after failure by the per-oral route.[1]

PRECAUTIONARY TREATMENT IN SIMILAR CASES.

I might well be asked what line of action a dental surgeon should follow if he thinks, or even suspects, that a tooth or other foreign body had entered the air passages while his patient is in the chair. Well, the first and most important indication is given us in the good old medical principle " *primum non nocere.*" We must first bear in mind the things the dentist should not do, and Chevalier Jackson has tabulated the following seven " dont's."

1. Do not reach for the foreign body with the finger, lest the foreign

---

[1] *Journ. of Larg.*, XXXIII., 1918, No. 6, p. 181.

body be thereby pushed into the larynx, or the larynx be thus traumatized.

2. Do not make any attempt at removal with the patient in any other position than recumbent with the head and shoulders lower than the body.

3. Do not hold up the patient by the heels, lest the foreign body be dislodged and asphyxiate the patient by becoming jammed in the glottis.

4. Do not fail to have a radiograph made, if possible, whether the foreign body in question is of the kind dense to the ray or not.

5. Do not fail endoscopically to search for a foreign body in all cases of doubt.

6. Do not pass an œsophageal bougie, probang, or other instrument blindly.

7. Do not tell the patient he has no foreign body until after a radiography, physical examination, indirect examination, and endoscopy have all proven negative " (235 *op. cit.*).

It will be gathered that several of the above precautionary measures are advised so as to prevent gravitation attracting the foreign body, particularly if of small size, into a deeper secondary bronchus. It is better, if possible, for the patient to rest until he can be treated lying flat and face downwards. In this position there is less likelihood of the foreign body falling into the middle or upper lobe secondary bronchi regions, where it is particularly inaccessible, and it is into these undesirable tubes that it might gravitate if the patient lay on his back or on one side. The patient should not be encouraged to cough or hawk up. The chances of success are small if the foreign body has passed the glottis, and the efforts may only drive the point of a sharp substance, like a pin or tack, deeply into the mucosa. In the case of a loose or larger body, the cough may drive it up into the glottis and so threaten asphyxia. If one felt certain that the tooth or other foreign body was in the œsophagus, these rules would not apply, but, short of that, it is wiser to follow them as nearly as possible until the case can be placed in the hands of a skilled laryngologist.

A MEDICO-LEGAL ISSUE.

That similar cases may be fraught with unpleasant legal consequences is shown by a paragraph in the *British Medical Journal* of December 7, 1912. It is therein recorded that a Glasgow dentist was sued for £1,500 damages. The pursuer alleged that in February, 1908, the defender allowed a portion of a tooth to fall down the pursuer's throat into his right lung; three years afterwards, during a paroxysm of coughing, he coughed up the tooth. Fault was denied by the defender. At the trial in March last a jury, under Lord Ormidale, returned a verdict for the pursuer, and assessed the damages at £750. The defender appealed for a new trial, on the grounds that the verdict was contrary to evidence, and that the damages were excessive. The report in the *British Medical Journal* concludes as follows :—
" The Division of the Court of Session (Lord Johnston dissenting) refused the application of a new trial. Lord Johnston was satisfied that the defender had suffered an injustice, and that the verdict was not only a bad one but that it was given in circumstances which called for a new trial, and he thought he was bound in fairness to the defender to say so."

I entirely agree with Lord Johnston, and I cannot imagine how any jury could give a verdict against a dentist after a similar accident, unless

it were proved that the dentist neglected to use reasonable care. The accident might be caused by sudden movements of the patient, as in my case. Even when the patient is under a general anæsthetic, his unconscious movements, and the consequent inspiration of the tooth might be fairly attributed, in some cases, to his previous alcoholic excesses, and not to the dentist's clumsiness! Or, again, might not inefficient administration of the nitrous oxide gas be the chief cause, and the anæsthetist be held responsible?

The public are only too ready to run all sorts of risks from quacks and charlatans, and to be silent when their silliness lands them in disasters; but they are equally hasty to blame the legally qualified dental surgeon or medical man if everything is not to their perfect satisfaction. Fortunately, the law of England is very fair and just, and we have rarely to complain of actions for malpraxis.

RESULTS OF BRONCHOSCOPY.

Let me just conclude by recalling what endoscopy has done for the benefit of humanity. In former times a certain number of foreign bodies, loose in the larynx or trachea, were coughed up sooner or later. Still, statistics in pre-bronchoscopic days show a death-rate of 52 per cent. The early years of bronchoscopy, *i.e.*, up to 1908, reduced the mortality to 13·1 per cent. (von Eicken). In 1909 and 1910 this was further reduced to 9·6 per cent. (Kahler). By 1913 the death-rate of various surgeons in the United States has fallen to 5·3 per cent., and Chevalier Jackson's own practice in his last 182 consecutive cases of bronchoscopy for foreign bodies gives a total of three deaths (1·7 per cent.) (p. 246, *op. cit.*).

Deaths that do occur are less attributable to bronchoscopy than to the results of the sojourn of the foreign body or to blind efforts at removal.

NEED OF EXPERT HANDLING.

But these favourable results can only be secured in experienced hands. Fletcher Ingals says he has seen numerous cases of fatal results from bronchoscopy, and he believes that "the fatalities with inexperienced people would run between 10 and 20 per cent. if all cases could be collected." The same writer appreciates the strain put on us by such cases. He writes : " The heart-breaking delays, the extreme anxiety for the patient, and the knowledge that prolonged operations of the kind are dangerous, while failure may spell death for the patient, place the operator under such circumstances under an indescribable stress." No wonder Chevalier Jackson says : " There is absolutely nothing like it in the whole realm of surgery."

MEDICAL NOTES.

By Sir THOMAS HORDER, M.D., F.R.C.P.

Assistant Physician to St. Bartholomew's Hospital, etc.

" Although it be a more new and difficult way to find out the nature of things by the things themselves; than by reading of books to take our knowledge upon trust from the opinions of philosophers; yet must it needs be confessed that the former is much more open and less fraudulent, especially in the secrets relating to natural philosophy."—WILLIAM HARVEY.

A.—ON METHODS AND TERMS.

(1) In diagnosis, one physical sign is of more value than many symptoms.

(2) As " probability is the guide of life," so is it the guide of diagnosis. *Cæteris paribus*, a common disease is more likely than an uncommon one to be the explanation of any particular set of signs and symptoms. This is a statement which it would seem absurd to make, if the fact was not so frequently forgotten.

(3) The fewer the physical signs found during the examination of a patient, the more extensive should be the search for them. For where there is little or no guide to the true nature of the case, light may appear in an unexpected quarter—in the blood, in the fundus oculi, in the stools.

(4) The terms " weak," " poor," " feeble," often applied to the pulse, are to be avoided on account of their ambiguity. The notion which the observer attempts to convey by them should be analysed, in so far as this is possible, into definite elements, such as frequency, volume, tension.

(5) The introduction of instruments of precision into diagnosis has marked a great advance in medicine, but the art of careful observation by the unaided senses has suffered in consequence. The practitioner has ceased to recognize the presence of fever apart from the help of the thermometer, he frequently fails to note a soft or a hard pulse until he " measures the blood-pressure," and he does not trust himself to say a patient is anæmic before the hæmoglobin is estimated. The great value of an instrument is to determine the *degree* of a condition rather than its existence.

(6) In order to obtain the best results during an examination of the chest the following points are worthy of attention : Choose a quiet room, one that is not too lofty and one that is not too bare of furniture. Place the patient in a good light. If the patient is nervous, defer the examination until he is reassured; the breathing of a nervous patient is shallow, and deep breathing is essential to proper examination of the lungs; the heart's action in a nervous patient is unduly forcible, and this may simulate disease. If the patient is chilly, warm him; muscular shiver may be mistaken for cardiac bruit or even for pleural friction. Place yourself exactly opposite to the patient and upon the same level; assuming that he is an adult, stand if he is standing and sit if he sits. See that your hands are warm, that your stethoscope fits your ears comfortably,

and that you have ample time for the examination; cold hands have poor tactile sense, ears that are in pain cannot attend to the sounds that reach them, and a pre-occupied mind does not tend to make accurate judgements.

(7) There are four methods of eliciting physical signs, whether in examination of the chest, abdomen, or other region of the body: Inspection, palpation, percussion, auscultation. Let not the practitioner be tempted to depart from the traditional sequence of these methods, for it results in fuller and more accurate data than does any other. Knowledge of this fact explains why the experienced observer, who could the more afford to, rarely changes the sequence; ignorance of the fact explains why the beginner, bent on novelty, frequently does.

(8) It is noticeable that percussion is performed in two different ways by different observers. In one way, the percussing finger strikes forcibly and deliberately, and attention is directed to the single sound thus produced before the tap is repeated. In the other way, a rapid series of very light percussions is used, and judgement is passed upon the summation of sound-effects. No doubt there are individual differences in the observers themselves that make one method of greater use than the other. The first method has the advantage that the sense of resistance—a very important observation during percussion and one which led to the universal discarding of plexors and pleximeters—is much better appreciated. And is it not perhaps a testimony to the greater value of the first method that the second is frequently used for the abdomen—a region where percussion is notoriously fallacious in its results, and therefore does not invite a very discriminating method—even by those observers who favour the first method in examination of the chest?

(9) If a physical sign, which is present in health, is found to be less marked on one side of the chest as compared with the other, the difference should be referred to in terms of the side showing the lesser degree of the sign. Thus, say, " vocal fremitus is diminished over the left base," or, " vesicular breathing is diminished at the left apex "; do not say, " vocal fremitus is increased over the right base," or, " vesicular breathing is increased at the right apex." The reasons for this advice are two :—(1) It is more difficult to judge the increase of a normal sign than its decrease, always bearing in mind that we have no absolute criterion of normal physical signs, but that we compare one side of the patient's chest with the other. (2) The side upon which the sign is diminished is probably the abnormal side; it is likely that other physical signs of disease will therefore be found on this side; attention is thus concentrated from the first upon the abnormal side, and is not required to shift from side to side during the recital of the physical signs.

(10) Voice-sounds are, in general, of less service in diagnosis than are breath-sounds. For this reason they are by some observers wholly discredited. But to do this is to forfeit a valuable means of obtaining clinical data. All that is necessary is to remember that the interpretation of changes in the voice-sounds calls for greater care than in the case of breath-sounds.

(To be continued.)

A METHOD OF REDUCING DISLOCATIONS OF THE SHOULDER JOINT.

By PHILIP TURNER, M.S., F.R.C.S.

Assistant Surgeon, Guy's Hospital, etc.

THE treatment of this very common injury does not, as a rule, at any rate in recent cases, present any difficulties. The various methods employed for reducing this dislocation are based upon the fact that practically always, at least when the dislocation is uncomplicated by fracture, the head of the bone escapes through a rent in the capsule at its weakest spot, that is below and to the inner side. The subsequent position of the head depends, doubtless, chiefly upon the position of the arm at the time of the injury and the direction of the violence which causes the dislocation. Most commonly the head of the humerus is displaced inwards and slightly downwards so that it rests on the anterior aspect of the neck of the scapula beneath the coracoid process. Reduction is generally quickly and easily effected either by Kocher's method, or by direct traction with or without the assistance of the surgeon's heel in the patient's axilla. In cases in which there is much muscular spasm or much pain, an anæsthetic will be necessary.

In certain unusual cases, however, these methods fail, even after several attempts. Difficulty in reduction is also very likely to occur in those cases which have been overlooked at the time of injury and which only come under treatment after an interval of some days or even weeks. In these old standing cases, the difficulty in reducing the dislocation is doubtless due to adhesions which have formed between the head of the humerus and the surrounding structures, and to cicatrization and contraction of the rent in the capsule; but in the above-mentioned troublesome recent dislocations it is often difficult to say exactly what is the hindrance to reduction. The most probable explanation is that the displaced head cannot be freed from encircling lacerated muscle or capsule and hence its re-entry into the glenoid cavity is prevented. Needless to say, in all these difficult cases, a careful radiographic examination is necessary to show the position of the head of the humerus and particularly to exclude any fracture of the humerus or the scapula.

I have treated a number of these cases, both recent and old-standing (the longest interval between the injury and the treatment being 24 days) by the following method :—

> The patient is anæsthetized lying on his back on an operating table or on a convenient couch. The surgeon now rolls up an ordinary washing towel and loops this round the inner side of the injured arm, just below the axillary folds, so that the free ends pass outwards at right angles to the long axis

of the body. The loop can equally well be made from a length of flannel bandage three inches in width. As soon as the patient is anæsthetized an assistant grasps the forearm on the injured side and, without moving the arm from the patient's side, applies extension strongly in a direction parallel to the long axis of the patient's body. At the same time the anæsthetist, whose hands are now free, makes counter-extension by slipping his fingers into both of the patient's axillæ, while the surgeon, grasping the free ends of the loop, pulls steadily in an outward direction. The extension, counter-extension, and external traction should be made simultaneously and steadily, as well as strongly, but without jerking. The head of the humerus enters the glenoid cavity at once with the characteristic click, and the arm is then bandaged to the patient's side.

I have now tried this method in about 12 cases, recent and old, in which other methods had been tried, in some on two or three occasions without success, as well as in a few recent cases as the method of choice.

In every case the dislocation has been reduced at once and without difficulty. All cases have been of the subcoracoid or the subclavicular varieties, but I see no reason why the other less common varieties should not be reduced in the same way, provided that there is no fracture. The principle of the method is that the downward traction draws the head down to the level of the rent in the capsule, while the outward traction pulls it through the rent into the glenoid cavity. Its success, where other methods have failed, depends probably upon the stronger and more direct outward traction to the upper part of the humerus. Though the surgeon requires two assistants, one for the downward traction and the other to maintain counter-extension from the axillæ, these may be both unskilled; the surgeon should apply the outward traction himself.

I have been asked whether there is any danger of injuring the axillary vessels with this method of reduction. In recent cases I should say there is none. Rupture of the axillary artery or vein is a rare accident in the reduction of the old-standing cases, and is due to these structures having become involved in adhesions around the displaced head; and hence I do not see that there is any greater likelihood of injury to the axillary vessels occurring with this than with any of the other methods. In any event it is a very rare complication, and did not occur in any of my cases.

THE PROBLEM OF THE DYSPEPTIC NEURASTHENIC.

By EDWIN L. ASH, M.D.

*Physician and Neurologist to the City of London Red Cross Hospital ;
formerly Physician (Out-patients) Italian Hospital, London.*

AMONG patients whose maladies we are accustomed to label with the convenient portmanteau term " neurasthenia," because in their total inefficiency they commonly exhibit certain characteristic weaknesses referable to the nervous system, there is one group in which the symptoms are mainly referred to the gastro-intestinal tract. It is the difficulties of these, the dyspeptic neurasthenics, that I wish to discuss.

As a rule they come to us with a history of many years' chronic ill-health, which has been combated with varying success and with a varying proportion of assistance from qualified and unqualified practitioners of healing arts. Birds of passage from one consulting room to another and from one treatment to another, they have largely lost confidence in anything that may be suggested for their health, yet must needs seek a little more advice for a condition of things which hampers their work, upsets their domestic happiness, and bids fair to rob them of that considerable success in life which the neurasthenic quite often finds within his reach.

Commonly below weight, and of delicate appearance, the sufferer plunges straightway into a story of persistent discomfort after meals, with flatulence, abdominal distension and pain; however careful he is in regard to meals, he suffers from sharp " attacks of indigestion," usually accompanied by a feeling of biliousness, furred tongue, lassitude, headache, and want of spirits. Frequently enough there is constipation, but it is also quite common for the patient to be unaware that the bowels are really sluggish in action. Again, not infrequently, one is told that indigestion and flatulence are sometimes accompanied with or varied by colicky pains, with numerous loose slimy motions. When this is the case, it is usual for inquiry to elicit the fact that such abdominal attacks are separated by periods of obstinate constipation.

Examination commonly shows that the stomach is distended, as evidenced by the large outline and splashing found on percussion. (Where such enlargement is known to be persistent, it is fair to speak of " dilatation," not otherwise.) The colon will also most likely be found distended in sections, whilst in a thin person with a readily slackened abdominal wall firm contractions may also be noted elsewhere. It is not unlikely that abdominal examination will

F

reveal a good deal of tenderness on firm pressure, such tenderness being not at all uncommon in the right iliac region when it is usually associated with a blown-up cæcum. On pursuing further the investigation of the gastro-intestinal tract by examining the stomach contents, it will often be found that an unduly large quantity of fluid remains constantly in that flabby organ, containing much mucus and undigested food. The stools will be found to be either small and scybalous or soft and full of mucus. In many cases there is an evident sagging of abdominal supports, with consequent dropping of the viscera, an observation which will be confirmed by an X-ray bismuth examination, if that is carried out later. Evidently there is plenty here to suggest that a thorough cleansing of stomach or colon will do good, and doubtless in many instances such ministrations are successful enough in bringing great comfort and relief to persons afflicted with " atonic dyspepsia " or " colitis " to use terms in common use.

However, before passing the invalid on for lavage from above or from below, let us investigate a little further. Perhaps he will have given us a clue to further understanding by saying that he sleeps badly, gets " tired in his head " after not much brain work, is short of breath after moderate exertion, or suffers from " nervousness " in various ways. Moreover, if we examine further, we shall find that he exhibits an unstable or weakened vasomotor system, as evidenced by shortness of breath and feelings of intense fatigue quickly remedied by lying down; whilst, although his nervous system may show no signs of organic disease, there will be very brisk, deep reflexes, over-sensitiveness to the light of the ophthalmoscope, and a general quickness of manner that suggests tired nerve centres.

There are two main factors at work in producing this picture :—
1. An inherent tendency to rapid fatigue of the whole physical system ;
2. A chronic poisoning which is, in some way, associated with the disordered gastro-intestinal tract.

Of this poisoning a number of familiar signs gives evidence, particularly headache, disturbed sleep with " morning tiredness," foul breath, tired eyes, indefinite pains in back and limbs, dull cadaverous-like skin, and presence of indican and allied products of fæcal decomposition in the urine; whilst obstinate constipation and furred tongue may indicate an obvious physical basis for gastro-intestinal auto-intoxication. But as in the majority we can trace a history of fatigue on slight exertion back to early years, and very often on account of some adolescent psycho-neurosis, youthful nervousness or childhood's nerve-storm, there is some difficulty in estimating to what extent the exhaustion and functional nervous disturbance is due to primary asthenia, and to what extent it is a secondary result of gastro-intestinal poisoning. Nowadays, there is an inclination to attribute all the neurasthenic symptoms characteristic of such cases to the toxæmia, regardless of the fact that so many patients suffering in this way bear in themselves the obvious signs of a delicate constitution, including, of course, a weak nervous system. For

the instances are comparatively rare in which a strong, healthy man or woman, free from psycho-neurotic taint, becomes so injured in health as to develop a chronic auto-intoxication, which re-acts on the nervous system so as to bring about a prolonged neurasthenic state. On the other hand, cases are extremely common in which a rather delicate person who has always been inclined to undue fatigue after exertion, and whose energies have never given enough margin for the ordinary demands of daily work and pleasure, gradually finds digestion and bowel action diminishing in efficiency; there being at the same time indications that the natural want of vigour is being further increased by auto-intoxication. The difficult cases are those in which physical signs are not much in evidence, and where there is all the difference between suspicion and confirmation. Fortunately, by careful X-ray examination after a bismuth meal, or by other tests, it is possible to detect sluggish peristalsis action without difficulty, and it may be taken as a certain axiom that when there is such alimentary languor, poisoning is a possibility that requires serious consideration.

But the very facility with which modern technique has provided us in the matter of detecting bowel stasis, and suggesting physical grounds for a diagnosis of chronic auto-intoxication, is in itself a trap to the unwary medical man who, carried away by local conditions, may be inclined to forget the primary neurasthenic state at the root of the illness. This essential want of vitality persists, however efficiently the muscles of the stomach and intestines may be " toned " up by massage, electricity, or what not, and however thoroughly the sluggish bowel be drained. It is owing to this common misunderstanding of the factors producing the vicious circle which drags down the health of the dyspeptic neurasthenic that in one consulting room the invalid is said to be suffering from gastric trouble— catarrh, dilatation, gastroptosis, and so on; in another, his case is diagnosed " neurasthenia," and in yet another he is said to be suffering from intestinal auto-intoxication; whilst in a fourth he may be told that " colitis " is the main source of all his troubles. These things may be true enough, but they represent parts and not the whole malady. It is because an illness of this kind is often not understood in its entirety, and is believed to depend wholly on some local disturbance, that so many dyspeptic neurasthenics receive but temporary benefit from treatment. This is unfortunate, because when one takes the broad view a great deal can be done to increase the total efficiency and usefulness of such semi-invalids, to say nothing of vastly adding to their family happiness and comfort in life. The gastric distension, dilatation and catarrh; the catarrhal (mucous) colitis; the bilious attacks; the gastroptosis, enteroptosis, and so forth, may be and often are present ; but time after time they represent peripheral results and not primary causes. In dealing with a case of this kind, the great outstanding fact should at once be realized that the problem is one of income and expenditure. That is to say, the patient has to adjust his life to suit his average co-efficient of

energy, otherwise the nervous depletion will obstruct any attempt at successful treatment. Clearly this raises a difficulty, for it is not open to everyone to change life's routine at the bidding of the physician, although fortunately one's task is rendered less arduous the more we understand the principle of conservation of nerve energy. Hard as it is to augment the natural vitality of the neurasthenic, it is nevertheless possible to enable him to make greater use of the vigour that is in him by practising the most stringent economy in regard to his nervous expenditure. Regular hours for work and rest, scrupulous routine in the matter of meals and sleep, are useful energy-saving measures. Where the system flags, brain, stomach and muscles should not have to contend at any particular moment for the comparatively small amount of energy that has to be distributed between them; but when one has to take up the tale of daily duty, the others should rest for that while.

The first step, then, in the treatment must be to take the patient into our confidence, and explain to him that he is not suffering from a " disease " that can be cured, or that will run its natural course, but that he is the victim of an inherent or acquired constitutional delicacy that handicaps him in life's race, and which can be the better combated the more its true relation to his daily life is understood and admitted. In my experience, such candid reasoning with the sufferer does not depress him, but, on the contrary, by showing him exactly how he stands, and, indeed, revealing to him a means by which—troublesome though it may be—his discomforts and disturbances may be lessened, gives him great confidence and that hope which is of itself one of our best tonics. It enables him, indeed, to start out on a definite programme of conservation, initiated by whatever is decided upon to give the jaded organs local relief; and experience shows that for those who can and will undertake the necessary measures—physical and psychological—the level of working efficiency can be enormously raised. Nor has one to be hopeless with regard to local relief, there being a variety of measures to hand, which offer great assistance to the keen practitioner who will take the trouble to understand the principles which should govern their usage.

Thus, before drawing up any definite programme of treatment, it is essential that some decision should be arrived at as regards the following three main factors in the illness—1. The degree of exhaustion—considered relatively to general physique; 2. The poisoning (auto-intoxication) that is going on; 3. The actual physical gastro-intestinal disturbance—dilatation, catarrh, visceroptosis and so forth—which, in the latter stages, is chiefly responsible for keeping up the poisoning.

It is, indeed, most essential to preserve a due sense of proportion, and the tendency to rest everything on the gastro-intestinal method of attack is much to be deprecated, important as alimentary measures are in the treatment of the dyspeptic neurasthenic. Thus let us beware of the enthusiast who seeks a complete " cure of the whole thing " by appendicectomy. Certainly a chronic inflammation of

the vermiform appendix is sometimes found, and when it is in such a state as to be a definite septic focus, discharging virulent matter into the bowel, clearly its removal is indicated, and must help the patient. But the point is often overlooked, that a catarrhal condition of the appendix is undoubtedly often present in neurasthenic persons without giving rise to any degree of toxæmia that can appreciably add to the auto-intoxication dependent on the catarrhal gastritis, enteritis, and colitis, from which a large proportion suffer. It should be remembered that the neurasthenic is a catarrhal person—and suffers from nasal catarrhs, bronchial catarrhs, and bowel catarrhs readily enough—so that if he is to be freed from all the discomforts dependent thereon by operative measures, nothing short of renovating his mucous membranes throughout will be likely to suffice. Moreover, just as some people are certain that the vermiform appendix is the chief cause of the dyspeptic neurasthenic's malady, so do the exponents of another school find the locus of offence higher up the alimentary tract, and believe that by a systematic and prolonged course of gastric lavage, relief will be given to the tired stomach, and, secondarily, to the whole system. Yet, again, the view that the colon is the sole offender in these cases finds many supporters, who will, therefore, persistently electrify it, wash it out, or cut it out, according to their bent. All methods— internal or external—which can be depended on to cause firmer and less spasmodic contractions of the flabby gastro-intestinal tube—such as drugs, massage, electricity or processes for causing reflex contraction by skin stimulation—may find a useful place in the plan of treatment for individual cases, but where they are relied on as the chief means of help, disappointment will result time after time. Of course, when vitality has been lowered by persistent malnutrition or poisoning, due to a definite and *demonstrably persistent* kink in the alimentary canal, operative measures are clearly the first step in any rational campaign ; but, this only applies to a minority.

It is only when the practitioner realizes that both dyspeptic and nervous symptoms are mainly due, in the first instance, to an inherent delicacy of the whole body—affecting both the nervous tissues and all other organs—that he will be consistently successful in helping dyspeptic neurasthenics. The mistake of concentrating attention exclusively on poisonings and their consequences, which are really secondary and tertiary results, is a vital one. That it is a common error to-day is witnessed by the numbers of patients who have been through treatments directed to the relief of these, but who have suffered a return of many of their old discomforts. As a matter of fact, in the average case there is little difficulty in both getting rid of alimentary poisonings and increasing the tone of the stomach and bowels with the very greatest benefit to the invalid, provided he can live a particular kind of life ; but there is very considerable difficulty in enabling him to maintain his renewed health, unless one at the same time sees that his reserve stores of nervous energy are steadily and slowly increased, and that his bankruptcy is redeemed by solvency.

It all comes back to this, namely, that the dyspeptic neurasthenic

must learn :—

1. To cut off as far as possible all unnecessary waste of general energy and to conserve the strength he has.

2. To avoid undue local strain of stomach and bowels by—

    (*a*) Care as to diet and habits of evacuation.
    (*b*) Recourse to physical means of relieving the slackness and tendency to dropping, resultant from deficient tone in the abdominal visceral ligaments.

3. To increase his capacity for energy output by mental and physical hygiene.

If all these things are taken into consideration, and the patient adjusts his life to meet his general capacities and limitations, then we can certainly give him a fresh start by judicious combination of nerve tonic and local gastro-intestinal measures. In giving him this start lavage, electricity, general or local, abdominal supports, aperients, paraffin or operative procedures, can be made to play a most useful part. Later, this " start " may be made to lead to great improvement in health.

Prevention is better than cure, and when recognition obtains of the individual asthenic diathesis, much subsequent misery can be avoided by an understanding of the true facts of the case; namely, that in the neurasthenic individual with abdominal symptoms there is a constitutional delicacy which results in too small an energy co-efficient—one that is unequal to the demands of strenuous life in our big cities. In a few, the depletion results from real overwork, or, rather, from exhaustion and shock which usually produce the breakdown generally attributed to overwork.

But in the care of the body, the hygiene of the mind must not be overlooked. In many neurasthenics, nerve energy is wasted and recuperation prevented by a morbid mental attitude. Correction of wrong thinking can be made to play a most important part in the relief of all forms of neurasthenia. Hence it is that a judicious psychotherapy, which will inculcate a true understanding of the condition to be combated—in addition to hope and self-confidence,—is a very helpful therapeutic agent. Depression, anxiety, morbid dwelling on abdominal symptoms can all be met from the mental side; whilst they persist, our task is but half accomplished, however much local physical benefit may be obtained from treatment.

———————— >● ● ●◄ ————————

THE PROPHYLAXIS OF THE FUNDAMENTAL PREDIS-
POSING INFLUENCES OF NEURASTHENIA PURA
AND THE PRE-NEURASTHENIC STATE.

By SIMON HARRY BENNETT, M.D.

Glasgow.

A.—GENERAL PROPHYLAXIS.

LITTLE or no attention is devoted in text-books to the question of prophylaxis in the treatment of neurasthenia, but regarding the disease as essentially an acquired condition, predisposed to in the large majority of cases by a congenitally susceptible nervous system, strengthens my contention that in the direction of preventive treatment much may be done to stamp out this growing malady. The disorder being excited by a gradually increasing instability of the emotional and vaso-motor centres, the result of a long-continued state of super-susceptibility of the brain or over self-consciousness, it is obvious that faulty educational methods, mental and physical, are very important factors in its causation; in my view, these act more powerfully and deleteriously than faulty heredity.

Prophylaxis must aim, therefore, at instituting a regimen of mental and physical training, best adapted to conserve and raise the energy of the nerve centres, especially those controlling emotional activity, and, if possible, to counteract inherited tendencies. To do this most effectively, we must go back to the plastic period of youth, when the seeds of mental character are sown and the nerve centres are most readily susceptible of educative influences, and nip the self-conscious mentality of the potential neurasthenic in the bud.

We cannot hope to eradicate hereditary characteristics, which, as I have said, constitute the basal predisposing factor in the causation of neurasthenia in most cases, but we may hope to check their baneful and devastating influences, and in a sense establish a resistance against them, by healthy methods of education and upbringing. We must, therefore, first and foremost recognize that the maintenance and development of the physical health during childhood far outweighs in importance any other consideration, and that our educational demands from the child must be subservient to this fact. It is, therefore, necessary to indicate what methods ought to be pursued, that will best conserve and develop the physical health and the mental strength and adaptivity to emotive influences, directing one's remarks especially, but not exclusively, to children who, by virtue of a neuropathic ancestry, are congenital or potential psychopaths.

a.—*The Physical Health.*

The factors which determine the state of the physical health are

heredity (the intrinsic factor), and environment, alimentation, personal hygiene, physical culture, habits, and rest which may be regarded as extrinsic influences.

Heredity.—This has already been touched upon. Syphilis, alcoholism, insanity, etc., etc., are recognized sources of neural weakness in the offspring, and a wisely devised legislation, which appears now to be looming on the horizon, may do much to obliterate these avoidable causes of faulty nervous heredity. But as the liberty of the individual, so far as mating is concerned, is and must remain a sacred, elemental, and inalienable attribute of civilized life, the incidence of neuropathic heredity will, therefore, probably continue, to the end of time, to have the value of a constant more or less, to be incapable of much material mitigation.

Environment.—Country life, with its pure and invigorating air, its calm, and ideal and naturally interesting attractions, is from the health point of view, the life to be preferred, *par excellence.* In towns, these features are lacking, and children are obviously at a great disadvantage. Town children, therefore, ought to spend the annual summer holidays in the country ; at all events, as much time as possible ought to be spent in the open air, and in towns, weather permitting, in the purer air of parks in outlying districts. Our advancements and improvements in sanitation, and our gradually increasing efficiency to prevent and to treat the diseases akin to infancy and childhood, that often inflict serious and lasting injury to the system, are factors of no mean value, helpful towards the maintenance and cultivation of the physical energy.

On the other hand, I hold that the present system of compelling children to begin their " schooling " at the tender age of five, is, in great measure, subversive of the principles upon which the development of the *mens sana in corpore sano* depends. To take the child of five away from its natural pursuits and inclinations, its sportful and ever-inviting toils, and to keep its mind under restraint as our present system of education compulsorily demands, forcing upon it a discipline and a teaching which, at such tender years, is little short of a punishment and too often a mental burden and boredom, is to diminish rather than to raise the resistance to those injurious influences—hereditary nervous defects, unhealthy environment, the stresses and strains of the conventionalism and over-civilization of present-day life, etc.—that conduce to mental insufficiency, instability, or vulnerability.

Has the age five been selected arbitrarily, or does the educational law in this particular subserve any canon of physiology ?

If, as is the case, no physiological justification exists, we have, *ipso facto*, the strongest reason for questioning the wholesomeness of our educational practice. It is a fact that the average town child of five years of age is too often physically puny and ill-developed, that it has to spend its life, for obvious reasons, more " cribb'd, cabin'd, and confined " than its rustic compeer. Further, the first ten years of life constitute, I think, the age-incidence of most of the

devastating diseases peculiar to children, so that during that time the conservation and development of the physical energy of the child should be the foremost concern of a rational education. Again, the amenability of the child to suggestion and educative influences increases naturally with age. I believe that nothing would be lost, and probably much gained if we allowed the child's mind to run loose, so to speak, until about the age of seven. Instead of keeping the child confined in the stuffy atmosphere of the classroom, however well-ventilated it may be, for five of the sunniest and, therefore, the best hours of the day, between the ages of five and seven, the "school" hours during these years ought to be spent in well-regulated physical exercise, in the open air whenever possible, under school supervision it may be.

But, in spite of the many educational reforms (so-called) that have been introduced in recent years, our present scholastic system still presents many features, besides the one just indicated, inimical to the physical well-being of the child. The indoor confinement, and the sedentary life associated with it, the overcrowding in classrooms with its attendant evils (vitiated air, etc.), and the excessive duration of classroom hours—all these are dangers to the physical health which our reforms have neither eliminated nor materially attempted to eliminate. But can they be? It appears to me reasonable to suggest that these dangers would in great measure be removed if the school hours were somewhat shortened, particularly in the earlier years of school life, and if our schools were built in the outskirts of towns instead of in the heart of them, with verandahs so as to permit of open air tuition in fine weather, and possessing, for purposes of recreation, four or five acres of actual field, instead of half-an-acre of stony playground. Under these circumstances, the increased distances between school and home, when too great, could be adequately met by a special school tramway or other vehicular service.

Alimentation.—Strict regularity in the taking of meals, a sufficiency of plain and nutritious food, proper mastication, an avoidance of excess of carbonaceous (that is fermentable) foods, are dietetic principles which ought to be rigidly insisted upon and observed. The practice of children to devour sweetmeats, pastries, and ices, though pleasing to the palate, is as dangerous to their health as it is prevalent; to it, in great measure, are undoubtedly attributable the decayed teeth, the impaired appetites, the bowel derangements, and consequent malnutrition too often met with in children.

Personal Hygiene.—The regular practice of hydrotherapy ought to be insisted upon from infancy. Appreciating the well-recognized sedative and tonic effects of such measures, and the awful neglect —sometimes unavoidable through want of facilities—of mothers (especially among the working classes), to enforce them among the children, we have all the more reason to lay stress upon the great benefit to the physical health which children would derive by getting a daily warm bath. Obviously, there ought to be a bath in every house, and legislation should compel owners to provide this hygienic

necessity in dwelling houses.

Attention to the bowels is of prime importance, and children ought to be made to understand that. In this matter, mothers ought to be very careful with their children.

Physical Culture.—A well-regulated amount of physical exercise, in the open air whenever possible, is essential for the physical well-being of the child. A proper system inculcated from early childhood might endure as a habit, and result possibly in an exalted physique of the race.

Physical exercises must possess the following characteristics :— (1) be easy of accomplishment and easily learnt; (2) involve little intellectual effort; (3) stop short of the limit of muscular fatigue, although requiring a fair amount of muscular effort; (4) not excite the emotional faculties to any appreciable extent; (5) not cause too much pulmonary embarrassment; (6) be pleasant and attractive. Hence such exercises as fencing, gymnastics performed on apparatus (horizontal bars, etc.), may act injuriously, whilst walking, skipping, etc., exercises in which the movements are more or less automatic, are to be recommended.

It is not intended, however, to reduce the child to a mere automaton in his physical performances, but the object aimed at must be so to adapt the latter during childhood that they will not harm but help to raise the stability of the psychical centres which mould man's emotional fitness to face the world and its growing sensationalism.

Habit.—The nature of the individual spells the sum total of the mental and physical impressions of habitual acts and environments, so that the reactions, for example, of sexual perversities, of parental vices which come habitually within the purview of the child's observation, of " late hours," of uncleanliness, etc., in short of bad habits, may affect adversely the physical consitution.

Rest.—There is no better sedative and tonic to the system, especially to the nervous system, than a wisely portioned amount of rest, particularly in its absolute form—sleep. Children between five and ten probably require not less than twelve or thirteen hours rest in bed, those between ten and fifteen about eleven hours. Children often do not take or get a sufficiency of sleep, so that their daily expenditure of energy is not adequately neutralized by their daily rest; the nervous system may suffer in consequence.

A propos, I know of no more pernicious practice among children than that of carrying milk in the early mornings, so prevalent in big towns. It is time that legislation prohibited this, inasmuch as the climbing of stairs is very fatiguing, the child is deprived of its requisite amount of sleep, and has, perhaps, to bolt its breakfast to be in time for school. Similarly, children under a certain age should not be permitted to work after school hours.

b.—*Intellectual and Moral Education.*

The state of mental character and health and the power of the mind to resist emotional stresses are largely determined by the nature

of the intellectual and moral education we receive from early child-hood, and the degree and kind of reaction this has on inborn nervous defects when these are present.   Hence arises the great importance of a rational system of intellectual and moral education.   A healthy mental and moral training must aim at the cultivation of a strong will-power, and of the faculty of facing and resisting emotional dis-turbances, and the crushing of any disposition towards shyness and self-consciousness.   Most sufferers from true neurasthenia will confess to having passed through the successive stages leading to loss of emotional control, viz., shyness, self-consciousness, introspection, and excessive emotionalism.

How, then, has the education of the child's mental and moral nature to be conducted so as to produce the maximum amount of good, the maximum amount of mental and moral strength ?   In the first place, I would say generally, that our treatment of the child, whether at home or at school, must be very gentle and overwhelmingly sympathetic. During the earliest years I believe it is a mistake, which parents not infrequently make, to repress the natural wildness of the child's mind by corporal punishment and the fear which it engenders, or even by scolding; in so far as it is natural, the unruliness of children ought to be tolerated within limits, of course.   By degrees the child's mind becomes more and more amenable to the influences of suggestion, which must be inculcated with great patience, gentleness and sym-pathy, and, above all, slowly.   The child ought to be made to cultivate the faculty of resisting conscious introspective mentation, and to overcome any inherited tendency towards timidity and self-consciousness; we may help him in this direction by encouraging him to speak and act, and by welcoming his remarks and deeds with a certain amount of praise, even when unmerited, correcting, at the same time, any stupidity or errors by gentle and sympathetic reasoning.   Exceptionally, however, strict and firm handling becomes a necessity, as when we wish to suppress such perversions of character as irritability, violent explosions of temper, sulking, and selfishness.

As previously stated, the actual intellectual or " educational " training should not begin until the age of seven, or thereabouts, and the duration of classroom hours should not be excessive.   There should be no homework until the child reaches the age of twelve or so, and what homework there is after that should easily be mastered in an hour or two.   Corporal punishment in schools should be entirely abolished, for it means correction by brute force and not by reason, and to that extent may act injuriously upon the nervous system.

The vast majority of true and typical neurasthenics are recruited from the ranks of children and adolescents who are inherently timid and self-conscious, and who are usually very much given to blushing; at school I believe it possible to combat, and, perhaps, overcome, such tendency to easy excitability of the vaso-motor and emotional centres, by making the pupil, from his earliest school years, come out to the classroom floor and face the class to do his poetical recitations, his

reading, etc., instead of doing these from his bench with his face to the backs of the pupils, or his back to their faces. In this way, we might gradually break him in, so to speak, to face company without experiencing mental distress, and in time the habit may become second nature in him. Children exhibiting a marked emotional temperament ought to be treated by the teacher with special gentleness and sympathy, or even, perhaps, in a class by themselves.

In the earlier school years, the intellectual tasks the pupil is asked to perform should be somewhat below his intellectual powers, " and should only increase in proportion to his development. If this condition is not fulfilled, if the child always feels that he is not able for his work, then the task set him, instead of being a salutary exercise, a training of his will and attention, will only serve to convince him of his powerlessness and discourage him. Little by little he will lose all confidence in his abilities and will mistrust himself; and this sentiment, once it has grown up and installed itself in his consciousness, may give rise in him to that moral paralysis that is called aboulia." The child should not be permitted to expose himself to causes that are likely to excite or agitate his mind. Up till about the fifteenth year, whatever reading he does ought to be regulated and carefully selected for him by the teacher or parent. Reading terrifying stories should be forbidden, as well as witnessing dramatic performances; even attendance at music-halls during these years ought only to be sparingly allowed.

At the period of puberty the child ought to be under our strictest supervision, and precautions, by good feeding and avoidance of undue mental work taken, so as to guard against the special strain thrown upon the nervous system at that time. Where the evil practice of masturbation is indulged in (and this obtains among many youths, and seemingly among girls also, especially in boarding schools), we ought to attempt to repress it by indicating to the child its resulting dangers to the health, although, as previously indicated, I believe that masturbation is not a cause of neurasthenia. Furthermore, girls, especially in boarding schools, ought to be forewarned against the onset of menstruation, and clearly given to understand its meaning.

B.—PROPHYLAXIS DURING THE PRE-NEURASTHENIC STATE.

Proper prophylactic measures instituted during what I have designated the pre-neurasthenic state, will in most cases, exert a beneficial influence upon the condition of psychical unbalance from which the patient habitually suffers, and will tend to avert the supervention of the neurasthenic syndrome.

The recognition of the pre-neurasthenic state is by no means so easy as that of confirmed neurasthenia, but in every case in which a patient consults a doctor complaining of prolonged and persistent headache, that ought to constitute a sufficient clue to make him inquire, after excluding other causes, into the existence or absence of the other symptoms comprising the pre-neurasthenic state. Where

the latter is diagnosed the physician should regard his patient as a potential victim to one of the most terrible afflictions that flesh is heir to, and treat him with appropriate seriousness. It should be plainly indicated to the patient that the headache, the constipation, the blushing, the self-consciousness, etc., from which he habitually suffers are all associated symptoms indicative of hyper-excitability of the vaso-motor and the emotional centres, that whatever aches he experiences, are expressive of functional nervous impairment, for which there happily does not exist any underlying organic cause.

In addition to such psychotherapy, which ought to be inculcated at each visit, the other measures (electrotherapy, hydrotherapy, medicinal remedies), elsewhere detailed* in the treatment of actual neurasthenia, will be employed with great advantage during the pre-neurasthenic state. Isolation of the patient, however, is seldom necessary. Particular emphasis should be laid upon the need for an adequate amount of sleep, and the exhibition of medicinal nerve sedatives and tonics. After a week or two of such " home " treatment, a holiday in the country is advisable. Indeed, the pre-neurasthenic should take a prolonged holiday in the country every summer. On resuming work, he ought to be careful of his habits—as regards sleep, mental overstrain, excessive sexuality, etc. From time to time electrotherapy may be resorted to. Games like chess, draughts, etc., should, for obvious reasons, be avoided, and mental relaxation and abstraction by frequent visits to places of amusement is to be highly recommended.

I do not regard the pre-neurasthenic state as a contra-indication to the prosecution of studies, since, firstly, it more often than not affects intellectual natures ; secondly, it is essentially a perversion of psychic and vaso-motor but not of intellectual function ; and, thirdly, if wisely treated, it can be ameliorated and its obnoxious progress arrested. The important thing when confronted with the pre-neurasthenic, is to recognize, that we are dealing with the precursory stage of the symptom-complex neurasthenia, and not treat symptoms dissociated from the causes upon which they fundamentally depend.

* *Vide* " The Treatment and Degree of Curability of Neurasthenia Pura," by S. H. Bennett, THE PRACTITIONER, May and June, 1918.

HYSTERIA AS SEEN AT A BASE HOSPITAL.

By J. L. M. SYMNS, M.A., M.D. Capt. R.A.M.C.(T.).

Neurological Department, Royal Victoria Hospital, Netley.

" Hysteria imitates almost every disease which befalls mankind. Whatever part of the body it attracts, it creates the proper symptoms of that part." In these words Sydenham, in the 18th century, attempted to define hysteria, and if we turn to the English text-books of neurology, we find evidence of the same elastic definition. The progress of two centuries is shown by the stigmata of Charcot, which, if present, are stated to be clear evidence of hysteria.

In a text-book of neurology, published in 1916, the presence of blood-stained tears, cutaneous hæmorrhage, and œdema are noted. On another page the following paragraph is found : " The artiste who earned an honest living at a Parisian music hall by making musical noises with his anus, was probably another example of visceral hysteria." To define this last condition as hysteria is to accept the definition of Sydenham in its widest sense, or to plunge boldly into the abyss of Freudian hypotheses, and say that the artiste's gift was due to some sexual desire, which had been repressed, and under some emotional trauma had come to the surface.

In 1908, at the Paris Neurological Society, Babinski, the great pupil of Charcot, showed that hysteria should no longer be considered as the Champion Imitator, but as a definite pathological condition, caused by suggestion, and which can be cured by suggestion. This definition has been received by French neurologists, but, as I have stated, English neurologists have persisted in the teaching of Charcot. Hysteria, as we recognize it, is the subconscious representation of the patient's idea of the disease from which he considers himself to be suffering. The functional paraplegic who has been buried, will portray, subconsciously, the symptoms that he would expect to find in a patient whose spinal cord was injured, and the greater his knowledge, the nearer he will get to the signs of an organic paralysis. If this is the case, how is it that Charcot and his followers have found their stigmata present in the majority of their cases ? Hemianæsthesia, pharyngeal anæsthesia, concentric narrowing of the visual field and the various painful areas, such as the iliac fossa, are none of them symptoms which are likely to suggest themselves to the mind of the ordinary patient.

If we agree that these stigmata are not likely to be the result of auto-suggestion, it follows, according to our definition, that they must be the result of suggestion given to the patient from some extraneous source. Babinski found that none of his cases showed any signs of these stigmata, and in the great majority of soldiers seen by me, these stigmata have been entirely absent. I propose, there-

fore, to analyse these stigmata, and show why they have been found by the followers of Charcot, and not by those of Babinski.

Pharyngeal Anæsthesia.—Major A. F. Hurst and myself, with the help of Captain Peters, drew up a scale, numbered from o to 10, to represent the different degrees of pharyngeal sensibility; o represented complete anæsthesia, and 10 the maximum muscular movement resulting from a uniform stimulation of the pharyngeal wall. We found that pharyngeal anæsthesia was present in 15 per cent. of both normal and hysterical subjects. No. 4, the normal response, being also present in an equal percentage of both classes. In other words, the fact that pharyngeal anæsthesia was frequently found in hysteria was noted by Charcot, whilst the fact that it is often absent in normal people, was not. This error in observation has been copied from book to book, and a surgeon quite lately delayed operation on an acute appendix, owing to the presence of this stigmata, which, to him, was indicative of hysteria.

Hemianæsthesia, etc.—Major A. F. Hurst asked a number of students, who had not yet entered the wards of a London hospital, to malinger a right hemiplegia. They showed the typical signs associated with hysterical hemiplegia, and in no case did anyone spontaneously complain of any area of anæsthesia; but as soon as a leading question was put, anæsthesia was noted. We have never found a case of hysterical anæsthesia among soldiers at Netley, except when they have undergone a detailed examination at some other hospital. We concluded, therefore, that this class of stigmata is the result of unconscious suggestion by the medical officer, and we ourselves have no difficulty in producing it by suggestion.

Visual Stigmata.—We have examined the vision of all cases by the rough finger method, which involves no suggestion, and have found the field of vision normal. If, however, the perimeter is used, a spiral and narrow field results; I will return to this later.

Hysterogenic Zones.—We have never found the tender point over the anatomical site of the ovary to be indicative of hysteria, although Purves Stewart quotes Steinhausen as finding it in 88 per cent. of 500 normal soldiers.

If, as I have suggested, the stigmata of Charcot are due to suggestion on the part of the observer, it follows that if Charcot had looked for other signs he might have handed down to us quite a different class of stigmata. Major A. F. Hurst and I, therefore, decided to invent three new stigmata, and at random chose the following :— 1. Nasal anæsthesia. 2. Umbilical anæsthesia. 3. An outward spiral field of vision. We found in a series of cases that we could by examination produce both nasal and umbilical anæsthesia. The outward spiral field of vision would appear more difficult. We found, however, if we used that suggestion machine, the perimeter, and instead of bringing the object from without inwards we reversed the movement, in every case an outward spiral resulted. In some cases, by reversing the direction, we produced an outward spiral in one eye and an inward spiral in the other. We felt justified, therefore, in considering that the stigmata were not the product of auto-suggestion but of unconscious

suggestion by the observer.

Hysteria is a pathological condition caused by suggestion and cured by suggestion. I want now to show that the environment of the soldier at the beginning of the attack points to the truth of this statement. I served with the 29th Division in the field during the Gallipoli campaign from April 25 to November 17, 1915, and during that time did not see a single case of hysteria. The strain during this period was considerable, when it is remembered that the whole occupied area of the peninsula was under the enemy's fire. This observation that hysteria does not arise in the field is borne out by the statements of medical officers, as quoted by Babinski and Froment. These observers also point out that Neri examined 2,000 cases immediately after the earthquake at Messina and did not see a single case of hysteria. They truly remark : " When the human soul is shaken by a profound and sincere emotion, there is no room left for hysteria." If we consider the views of those behind the line, we find that it is in comparative comfort that hysterical symptoms develop.

Hysteria is caused by suggestion. With the rest and re-action after the strain of action, the patient has the time and opportunity to think and brood over his condition, and then the hysterical symptoms appear. Roussy and Lhermette concisely describe these three phases in the genesis of hysterical symptoms. The period of emotional shock during which the instincts of self-preservation tend to inhibit the emotion; the period of meditation; and, thirdly, the fixation and realization of the emotional re-action which, in view of the environments, is no longer inhibited by the instinct of self-preservation. In a paper of this kind it is impossible to include the many and varied phenomena associated with hysteria in soldiers, and I propose to note the chief types met with.

I. *Hysterical Gaits.*—When one realizes the complexity of the system of equilibrium and co-ordination, it is not surprising that abnormalities in walking should be one of the commonest types of hysteria. During the last year, I have seen many cases which can be classified under the following heads :—

a. The tacking gait, in which the patient is unable to keep to a straight line and tacks from side to side.

b. The pseudo-ataxic gait, which varies from a mere difficulty in walking to an absolute loss of equilibrium, when the patient completely loses his balance and falls to the ground. An intermediate condition is seen in which the patient walks as if on a tight-rope, and another in which the patient appears to be battling against the wind.

c. The pseudo-spastic gait, in which arms and legs and body are held rigid.

d. The unilateral gait, in which the patient moves with a lateral swaying movement. One case of this type was seen following a retrocæcal appendicular abscess. The rigidity of the ilio-psoas had persisted owing to auto-suggestion.

e. The senile gait, in which the back is bent and the patient walks with two sticks. This type often follows an injury to the back or an attack of muscular rheumatism. A similar type is met with in which

the spinal curvature is lateral instead of antero-posterior. The origins of the ataxic and tacking gaits are not always clear, but in many cases they are caused by the suggested persistence of vertigo which followed on the explosion or burial. In others they are largely emotional, and due to lack of control.

The spastic types are often the result of local injury, the body or limb being kept rigid to avoid pain or discomfort. In some cases, it may be the persistence of the rigid attitude of fear.

II. *Hysterical Paralysis.*—(*a*) Pseudo-hemiplegia. (*b*) Pseudo-para-plegia. (*c*) Pseudo-monoplegia. (*d*) Pseudo-paralysis of an anatomical region or a group of muscles. These will be discussed under the heading of "diagnosis"; they usually follow trauma of some kind, burial, trench foot or wound, and are flaccid or spastic.

III. *Hysterical Contractures.*—(*a*) *Hysterical club foot*, in which the foot is immovable and extended, and the patient walks on the external border of the foot. (*b*) *Hysterical contractures of the hand*, resulting in the classical type of *main d'accoucheur*, or, in other cases, in the flexion of one or more fingers. (*c*) *Hysterical contracture of muscles*. An example of this is the contraction of the sterno-mastoid, result-ing in an hysterical torticollis. These contractures of the hand and foot result, as a rule, from trauma, while the one case of hysterical torticollis, followed on an attack of " wry neck."

IV. *Hysterical Tremors.* — 1. Generalized atypical tremors. 2. Limited atypical tremors. These tremors vary in intensity; when at their height the whole limb shakes, and the patient may be unable to walk. They are often associated with an extreme emotional state. The presence of a stranger or the banging of a door increases their violence, and there is usually a marked defensive reflex. 3. Typical tremors, which are similar to those found in disseminated sclerosis or paralysis agitans. At times one sees cases of a choreiform type. I have never seen the fine rapid tremor of exophthalmic goitre in hysteria; this type is invariably associated with the hyperthyroid type of neurasthenia.

V. *Hysterical Errors of Speech.*—(1) Dumbness; (2) Peculiarities of speech.—(*a*) Stammering. (*b*) Latent period between words. (*c*) Inarticulate. (*d*) Whispering. (*e*) Associated movement of limb. There is a definite association between dumbness and the emotion of fear, and the condition is often associated with an hysterical deaf-ness. Stammering and the latent period of speech are extremely common following shell shock, and represent the state of emotion that was associated with the trauma. The inarticulate cases I have seen followed injury to the jaw, and were subconscious continuation of the difficulty of talking due to the injury. Whispering, in my cases, often followed an attack of laryngitis.

The cases I have seen, in which speech was impossible unless accompanied by movement of a limb, were all associated with emotion, of which fear was the basis. It is important to note that all types of defect of speech are very liable to be copied.

VI. *Hysterical Fits.*—(*a*) *Emotional*, these are rarely seen in my experience, but are more common among the French, who describe

G

them under the term *grande hystérie*. (*b*) *Pseudo-epileptic*, these represent the patient's idea of a fit, and are associated with fear. The patient is never cyanosed, knee-jerks, ankle-jerks and plantar reflexes are normal during the attack. There is no incontinence of urine or fæces. Consciousness is never lost. Opisthotonus is of frequent occurrence, and the patient seldom inflicts any injury on himself.

VII. *Hysterical Deafness.*—Usually follows upon the inability to hear during a prolonged bombardment.

VIII. *Visual Disorders.*—These are less frequently found in a neurological section, for they are almost invariably transferred to the special department.

Complete amaurosis, photophobia, and blepharospasm are chiefly seen. They usually follow upon a bombardment with asphyxiating or tear shells, and sometimes the presence of dust or a foreign body appears to be the precursor. They appear as isolated symptoms or in association with other hysterical lesions.

IX. *Alimentary Hysteria.*—(*a*) *Vomiting.* I have seen several cases in which hysterical vomiting has been present, the patient's appetite was not affected and weight was not lost. Under observation, deceit was excluded. One of the patients dated his complaint to an occasion six months previously, when he was gassed by a chlorine shell. He appears to have swallowed saliva saturated with the gas, and to have developed a toxic gastritis. This must have recovered, and the vomiting persisted owing to auto-suggestion. In the other case, quoted by Major Hurst, the patient dated his symptoms to the day when he was detailed to bury some decomposing bodies. He felt sick and dizzy, and on the completion of the duty he vomited, which symptom persisted. In these cases there were no signs to suggest organic disease, and treatment on the lines of suggestion was successful. (*b*) *Constipation.* I have seen several cases in which trauma, either from operations such as fistula *in ano* or gunshot wounds, has been followed by constipation of the dyschezia type. Pain on defæcation had caused inhibition of the act, and the fæces have accumulated in the rectum, so a vicious circle has been set up. These cases respond to re-education, by which a normal daily evacuation can be obtained.

X. *Respiratory Hysteria.*—*Tachypnœa.* In these cases, there is sudden acceleration of the respiratory movement, usually associated with a marked emotional state. The attack may last for a few minutes or longer, during which the patient is unable to move.

XI. *Disorders of Sphincter Control.*—Incontinence of urine is comparatively common following shell-shock; the patient is possibly unconscious or in a dazed condition. Urine is passed subconsciously, and he continues to have incontinence. This class of case gives no previous history of incontinence, and responds to treatment by re-education and suggestion. Care must be taken to differentiate slight lesions of the cauda equina. Retention of urine is never met with, and incontinence of fæces as an hysterical symptom does not exist.

DIAGNOSIS.

On the subject of diagnosis, little reliance can be placed on the

existence of an interval between the injury and the appearance of
nervous symptoms. We have to rely on the absence of those objective
signs which characterize organic disease of the nervous system :—

   (*a*) Optic neuritis, optic atrophy, heminanopia.
   (*b*) Alterations in electrical reactions of muscles and nerves.
   (*c*) Alterations in the superficial reflexes, *e.g.*, extensor plantar
      reflex.
   (*d*) Loss or great exaggeration or inequality in the deep reflexes,
      e.g., knee and ankle jerks.

There are also other signs of an organic lesion, which are of considerable
importance :—

   (*a*) *Babinski's 2nd sign.* Combined flexion of the thigh and trunk
on the paralysed side, when the patient attempts to rise from the
prone to the sitting position, the arms being folded.

   (*b*) *The pronation sign*, in which the hand when tossed assumes a
position of pronation.

   (*c*) *The fan sign.* Spreading of the toes associated with the
extensor plantar response, obtained when the sole of the foot is
stimulated.

   (*d*) *The presence of hypotonus*, shown by the exaggerated flexion
of the forearm on the affected side.

   (*e*) *The platysma sign*, which is shown by the absence or diminished
movements of the fibres of the platysma on the affected side when the
mouth is opened.

   The importance of these physical signs is never realized so fully
as when one is dealing with hysteria, but the fact should be always
kept in mind that hysteria may be associated with an organic lesion.
Cases of this type frequently occur. We have at present several
patients, who were admitted with an undoubted hysterical gait following
an injury to the spine. On examination, knee-jerks and ankle-jerks
were absent. Under re-education and verbal suggestion they were
enabled to walk. I think it is probable that these are cases of
hæmorrhage into the posterior columns with hysterical symptoms
superimposed. Hysteria is a pathological condition which can be
cured by suggestion. The proof of this statement lies in the wards
of a properly conducted Neurological Section ; at the present moment
at Netley, we can show few cases that present any gross hysterical
lesion.

   The great factor in the cure is an atmosphere of cure. The patient
is placed with others who are now well, and one can always count
on them telling him of their recovery. In recent gross hysterical
lesions, direct suggestion will obtain a cure. In old hysterical lesions,
that have passed through many hands, continuous suggestion, some-
times lasting 4 to 8 hours at a stretch, is necessary, and this is followed
by re-education. In cases of hysterical fits, hypnosis is used. A fit
is produced which, incidentally, differentiates conclusively the nature
of the attack. Hypnotic suggestion is then given that there will not
be a recurrence. In cases of hysterical deafness and paralysis of the
hand and foot, which do not respond to direct suggestion, ether is

administered, and in the stage of excitement, suggestion is given and continued until the patient regains full consciousness. It is extremely important that the patient should not be allowed to relapse into sleep, for this often leads to a recurrence of the symptoms. Dumbness and aphasia usually respond to intra-laryngeal catheterization, with or without electricity, and Major A. F. Hurst was in this way able to cure eight aphonic patients at one hospital within a few minutes. Errors of speech are dealt with by suggestion, and in early cases this is sufficient. In the few late cases that do not respond, re-education by the orthodox methods is employed. It is not possible in this paper to discuss fully the psychical history of the cases. In some, the stress of service conditions is alone responsible; in others, there are signs of general instability, which must be brought to the notice of the individual to aid him in increasing his stability. The treatment, as I have pointed out, depends largely on suggestion, and it is extremely difficult to describe the routine carried out in each case. Patients are always seen privately, and a cure is obtained, if possible, at one sitting. The patient, if well prepared by conversation with other patients, is in the ideal mental condition for cure.

If educated, he can often be told plainly that the condition from which he is suffering is not organic, and if he helps to perform the passive movements that are about to be carried out, the disability will leave him. In the soldier, by attracting his attention, one can often get a cessation of the spasm or a voluntary movement, which, if suddenly pointed out to him, will form the starting point in his cure. In dealing with patients who are unable to follow the scientific argument, direct suggestion, by means of massage or electricity, are followed by cure, but, in the case of electricity, painful stimuli are to be avoided. The great secret of treatment lies in the seizing any signs made by the patient that will serve to suggest a cure, and following it up until the hysterical lesion is mastered. It is always difficult to say how long the treatment will take. In one case, I was eight consecutive hours in overcoming an hysterical clonus of the jaw, and this week, a tremor of the hands, which had persisted 13 years, vanished in a few minutes. Hysteria is a pathological condition, caused by suggestion, and cured by suggestion. Here we have a clearly definite condition, in place of the old conception, which made hysteria the mirror of every ill that could befall mankind.

I have to thank Major A. F. Hurst for permission to publish the observations mentioned in this paper under his name.

POSTSCRIPT.

Since reading the above paper before the Southampton Medical Society in January last, our methods of treatment have become considerably modified. At Seale Hayne Military Hospital we now rely on persuasion, whilst electricity and other vehicles of suggestion are daily tending to play a smaller part. If the cause and nature of the condition is clearly pointed out to the patient, strong verbal persuasion and intensive re-education are sufficient for a rapid cure.

HYSTERICAL " PARALYSIS " OF LONG STANDING.

By LAUGHTON SCOTT, M.R.C.S.

From the Lancaster Clinic.

THE cases of functional paralysis described in this article were drawn from the Special Medical Board, which examines all cases of functional disorders on and after discharge from the services. These " paralyses " are not nearly so common as in the early days of the war; but those that are met with are veterans in their complaint, having survived protracted treatment by every sort of method. The length of history of the series varies from 9 to 42 months, and averages about $2\frac{1}{4}$ years, while several have been some time in civil life. The ten cases represent all of the sort seen by the writer at the Lancaster Clinic over a period of three months.

The criticism most likely to be brought against the sudden, and therefore dramatic, correction of such disorders will be that the patient's general mental attitude is not improved thereby, and that relapse is more probable than would be the case if the slower and more laborious methods of re-education were employed. However, the writer has always been at pains to explain to each patient the simple trick by which a cure has been effected, and to indicate the psychogenesis of the disability; so that a man's recovery may actually serve as a demonstration of the necessity of guarding against symptoms which have no more solid basis than a false idea. But the great advantage is the economy of time. Two straightforward cases were taken and treated by the ordinary re-educational methods, for the sake of comparison; one of them had recovered in three months, while the second had not fully got back the use of his arm after four months' regular attention. This question of time saved is a matter of importance, both in view of the enormous numbers of cases of the various psychoses to be dealt with, and because of the state of mind of the patients themselves, who often frankly declare that they " don't want to be messed about any longer " !

In regard to permanence of cure, there was nothing in the shape of a relapse in any of the cases.

The technique of the process is simple, one had almost said unblushingly simple. Every case has undergone so much unavailing treatment that the promise that an immediate cure will be effected would be met with blank incredulity. The assurance must be reinforced from several sources. It happens that the attendant has himself been cured of " paralysis," and he is instructed to demonstrate the fact to the newcomer as he shows him into the waiting-room. There the prospective patient meets a second recovered case, who talks with him for a while; and by the time he sees the physician,

doubts will have crept in as to the permanence of his disability.

The first interview is merely used to check the diagnosis, and the man is informed in an off-hand manner that he is to present himself for cure at some given early date. The elapse of a few days serves, as it were, to incubate the sense of hope; and on his second visit the patient is allowed to come into contact with yet another cured man, and after this he has invariably passed from scepticism into a state of expectant excitement. Little now remains to be done. The limb is immersed in hot water to improve circulation and electrical conductivity. It is best at first mildly to stimulate a normal area and to work gradually down, as it were, chasing the anæsthesia to the distal end of the limb; and it will be found that a very moderate strength of current will be sufficient to dispel the anæsthesia if it is applied in this way. A strong application will cause sudden pain, and rouse the resentment of the patient. Once sensation returns, a vigorous demand is made upon the man to move the proximal end of the limb. This he invariably does in his excitement, and the return of function to the rest of the limb is merely a question of minutes.

To pass to a consideration of the individual cases :—

1. Officer.—Invalided from France in August, 1916, with mutism and functional paralysis of the lower limbs. Presented himself on crutches. He had treatment by various re-educational methods and by massage and electricity for over a year, followed by various treatments as a civilian. Both limbs were greatly wasted. Duration 19 months. He was seen 14 days after treatment had been applied. He had walked a distance of five miles to the clinic. His voice was normal.

2. Private.—Shell shock, November, 1915. Total flaccid paralysis of right arm and loss of sensation extending to neck and chest. Not much wasting. Duration, 25 months; all movements of arm were restored in 15 minutes, and on his following visit he had regained almost normal power.

3. Private.—In October, 1916, after a fall developed a habit of dragging right leg. This resisted every attempt at cure, and after a year at hospital he was discharged. Duration 18 months. The condition was found to depend on a functional paralysis of the muscles of the front of the thigh, and full use was recovered in a few minutes.

4. Private.—Wounded in calf, August, 1915; contracture of calf muscles developed, preventing him putting the heel to the ground and causing a halting walk. Duration 23 months. After discharge he was treated for eight weeks by ordinary gymnastic methods without result. This "reflex" contracture yielded after five hours treatment by fatiguing the muscles, and his walk became normal.

5. Officer.—Blown up September, 1916. Paralysis of left leg. $2\frac{1}{2}$ in. wasting in middle of thigh. Walked with great difficulty with aid of crutches, leg hanging useless and flexed at knee. General condition very poor. Had had uninterrupted treatment since shortly after onset. Duration 20 months. Complete movement returned in a few minutes. For some weeks after remained slightly flexed, but at the end of a month his walk was normal and he soon returned to suitable occupation in civil life.

6. Private.—In November, 1914, bullet wound in left temporal region Originally the whole arm was useless and condition apparently diagnosed as

organic. The use of the arm above the elbow seems to have returned suddenly in 1915, but on discharge in December of that year hand was useless. Duration, 42 months. Analgesia of hysterical type and extremely weak flexion to extension of fingers. Full sensation and moderately powerful movements returned in a few minutes, and hand was normal at second visit.

7. Private.—In July, 1916, hit by bullet in back of right neck. Paralysis of leg recovered, but arm resisted all forms of treatment. Duration, 22 months. He had practically recovered full use of arm between the first visit and the application of faradism; after the application, the function of the arm was fully restored.

8. Private.—Paralysis of reflex type after wound of right thigh in November, 1914. Complete loss of voluntary movement of the right leg. Duration, 37 months. Return of movement not complete. He was instructed to do exercises, and a month later presented himself walking normally but complaining of some sciatic pain.

9. Private.—In August, 1917, found his foot became inverted after fatigue. He fainted on a route march, and on recovering consciousness had lost all use of left leg. Much unavailing treatment till discharge. Duration, 9 months. Typical hysterical condition with profound anæsthesia. This was cured in 15 minutes, but an underlying organic weakness of the peronei was found which was greatly improved by exercises and temporary support.

10. Private.—In July, 1916, fell off a motor lorry and complete " paralysis " of right limbs resulted. Much unavailing treatment of various sorts. Duration, 18 months. Intense spasticity of leg. Contracture of arm at elbow, wrist-drop, very weak grip, walks with two crutches. After three hours' treatment by fatigue-method, walk was normal and function fully restored.

No claim is made that there is anything essentially novel in this procedure; indeed, confident assertion combined with the use of the battery is among the most primitive means of suggestion. But the systematic preparation of the patient's mind by the cumulative testimony of several persons makes it absolutely unnecessary to use either forcible or painful methods; and the rapid and regular success with the most inveterate cases gives the operator the greatest confidence.

One always feels justified in defeating gross hysterical manifestations by hysteria's own weapon—credulity. Nor has the writer found any deleterious effects on the patient's mental outlook; a full explanation of the steps of the harmless guile that has been practised enables the patient to see things in their proper light. Indeed, the result is sometimes definitely beneficial. The first of the series is a case in point. At the outset he was neurotic to a degree, but the removal of his most disabling symptoms caused such a decided general improvement that in six weeks he re-enlisted, and hopes shortly to return to France.

THE DIAGNOSTIC SIGNIFICANCE OF HÆMOPTYSIS.

By EDWARD G. GLOVER, M.D.

Medical Superintendent, Birmingham Municipal Sanatorium, Salterley Grange, Cheltenham.

THE alarm inspired by unexpected spitting of blood is so deep, that the laity almost invariably place the most serious interpretation on its occurrence; at the same time, all physicians know that isolated hæmoptyses are frequently followed, even years later, by the development of clinically apparent phthisis, which accounts for a similar interpretation being accepted by most clinical observers. Indeed, one can easily imagine that even were hæmoptysis definitely proved to be non-tuberculous, this lay dread and clinical suspicion would be very little lessened thereby. On the other hand, considering hæmoptysis merely as a means towards indicating the presence or otherwise of active disease, it would not be illogical to say that, even if the cause was invariably a tuberculous lesion, a *history* of hæmoptysis at any rate would not necessarily indicate active disease at the time of examination. After all, the importance of hæmoptysis has been determined by the history of cases which have subsequently exhibited signs of consumption, and not of those which did not develop any lung disease. In the light of modern knowledge as to the frequency of mild, almost spontaneously healing, infections, some revaluation of the significance of hæmoptysis seems desirable.

Briefly, the accepted views on hæmoptysis are as follows :—There is striking unanimity amongst all writers that, other gross sources being excluded, it is invariably suggestive of pulmonary tuberculosis, but many observers suggest that non-tuberculous sources should first be excluded, whilst many more hold that all hæmoptyses should immediately be classed as tuberculous until the reverse can be very definitely established. When we inquire what may be included within the term, some slight difference of opinion is evident. Many writers follow the logical course of laying the same emphasis on slight streaks or flecks of blood in the sputum as on the spitting of appreciable quantities of blood (Hartley,[1] Bartlett,[2] Thompson,[3] and others), but Caillé[4] says very definitely, " By hæmoptysis we understand a coughing up of pure blood, not an expectoration of blood-stained mucus "; Minor,[5] too, says, " Small streaks and spots of blood in the sputum do not justify the term of hæmorrhage." Others exhibit a similar tendency by reference to non-tuberculous causes of streaks. Bonney,[6] says, " Expectoration of blood-stained mucus from congestion of bronchial mucosa has but slight significance."

Dealing more particularly with prognosis, the same uncertainty about the significance of small hæmoptyses is shown by various writers.

Cornet[7] says, " Traces of blood in the sputum, small hæmorrhages of two or three dessertspoonfuls are in themselves of no moment," and Kidd,[8] " The greater the amount the more considerable the significance." Nevertheless in ordinary sanatorium practice, small hæmoptyses are the rule; in 4,125 cases of hæmoptysis at the Brompton Hospital, the amount was under half an ounce.

On the question of incidence in ordinary phthisis, there is again difference of opinion, as the following percentages suggest :—West,[9] 70 per cent.; Williams, 70 per cent.; Brehmer, 66 per cent.; Grancher, 66 per cent.; Dieulafoy,[10] 60 per cent.; Roepke,[11] 50 per cent.; Minor, 40 per cent. to 60 per cent.; Bartlett, 45 per cent.; Abraham,[12] 34·5 per cent.; Condie, 24 per cent. From these figures it is at any rate clear that the absence of hæmoptysis is of no significance. More important is the frequency of hæmoptysis as an initial symptom. Bonney found that 20 per cent. of 900 private cases came under this heading, and 17 per cent. of 2,070 other cases. Barnes,[13] gave 15 per cent. as his estimate; Reiche, 9 per cent.; and Bartlett, 6 per cent. of 400.

As to the significance of a *history* of hæmorrhage, there are few figures available. Of 2,070 cases of phthisis, Bonney found 25 in which the disease was discovered one year after, 13 two years after, and 32 more than two years after the hæmorrhage had occurred. Of the after-history of hæmoptyses occurring in the general population, there is practically no accurate knowledge. The nearest approach to this information is found in the military statistics for countries where recruiting by conscription is followed, and of those the figures given by Stricker for the Prussian Army, during the years 1890–95, are most widely quoted.

His records dealt with 900 cases of hæmoptysis, and he concluded that when hæmorrhage took place apart from undue exertion, 86 per cent. of the cases were tuberculous; when after moderately hard exercise 75 per cent. were positive; and when after severe exercise 50 per cent. were cases of tuberculosis. It must be noted that out of 480 included in the first and most important class, in only 221 (45 per cent.) was the diagnosis conclusively confirmed. Bartlett quotes 369 cases of hæmoptysis after over-exertion in military manœuvres, of which 74·4 per cent. were tuberculous.

The *résumé* given above is inconclusive in many respects, and as a preliminary to investigating the diagnostic value of hæmoptysis in doubtful cases, the writer has collected the after-histories of 615 cases (159 with hæmoptysis and 456 without) over an average period of five years. Most cases were traced for over four years (some for six), and it will be observed that in the majority of those dying, death was noted within the first two years. As subsequent histories of hæmorrhage were often indefinite and not capable of subdivision, only those with a history of hæmorrhage before or during observation were considered. Hæmoptyses were divided into three categories, small, medium, and large. The first included all streaks of blood, blood-tinged sputum, and bloody sputum provided the total quantity during any one attack did not exceed two drachms; the second was held to include hæmoptyses

over two drachms and up to two ounces ; and the third all single attacks with more than two ounces at a time. The selection of cases with or without hæmorrhage was made over identical periods of sanatorium admissions, the cases lost sight of or discarded were approximately the same for both types, and although the total percentage of cases of phthisis with hæmoptysis is consequently valueless, from the point of view of prognosis, the two sets of cases are as comparable as can be hoped for.

The following table gives the most important details :—

After-history of 615 Cases of Phthisis followed for 5 years.

		Cases.	Alive.	Dead.	Per Cent. Dead.
T.B. +	With hæmoptysis	125	60	65	52 ⎫ T.B. +
	Without hæmoptysis	372	163	209	56·2 ⎭
T.B. −	With hæmoptysis	34	28	6	17·6 ⎫ T.B. −
	Without hæmoptysis	84	75	9	10·9 ⎭

Hæmoptysis.		Gr. I.	Per Cent. Dead.	Gr. II.	Per Cent. Dead.	Gr. III.	Per Cent. Dead.	Total.	Per Cent. Dead.
T.B. +	Small	13	7	31	42	19	89	63	49 ⎫
	Med.	5	40	15	60	16	68	36	61 ⎪ T.B. +
	Large	4	25	15	33	7	85	26	46 ⎪
	Total	22	18	61	44	42	81	125	52 ⎭
T.B. −	Small	13	—	3	—	1	—	17	— ⎫
	Med.	5	20	3	33	2	50	10	30 ⎪ T.B. −
	Large	4	75	3	—	—	—	7	43 ⎪
	Total	22	18	9	11	3	33	34	17·6 ⎭

Without Hæmoptysis.	T.B. +			T.B. −		
	Gr. I.	Gr. II.	Gr. III.	Gr. I.	Gr. II.	Gr. III.
Total cases	64	196	112	57	26	1
Dead	19	103	87	3	5	1
Per Cent. Dead	29	52	77	5	19	100

Percentage Dead, dying within 2 years. (Hæmoptysis only.)

	Small.	Med.	Large.	Gr. I.	Gr. II.	Gr. III.
T.B. +	86	73	75	50	66	91
T.B. −	—	66	100	100	—	100

It is clear that no history of hæmoptysis, however slight, can be ignored; in exactly one half of all cases the bleeding was of a slight character, to say nothing of those patients in whom, in addition to severe hæmoptysis, there were occasional streaks from time to time. Taken as a whole, hæmorrhage did not seem to affect the ultimate mortality of cases with tubercle bacilli in the sputum; in fact, the mortality of non-hæmorrhagic cases was heavier. Closer examination shows, however, that the number of " stage I. " cases with slight hæmorrhage waters down the mortality to some extent, and that severe hæmoptysis is of some slight prognostic significance in bacillary cases.

Flint held that hæmoptysis might be of favourable import, whilst Elderton and Perry,[14] as the result of statistical examinations, stated that patients who have had hæmoptysis will, as a whole, have a slightly heavier mortality than those who have not. Unless with very early cases, the amount of the hæmorrhage does not seem to be of very much importance, the main factor being the stage of disease.

When we consider those with no bacilli in the sputum, it will be seen that although the stage of disease is still an important factor, the size of the hæmoptysis is also of some significance. The mortality of non-bacillary cases with hæmoptysis is much the heavier of the two, and this is due chiefly to the death-rate amongst those with a moderately large or severe bleeding. The numbers are, however, more slender, and therefore more liable to give exaggerated percentages.

Whichever way we look at it, the importance of small bleedings amongst non-bacillary consumptives is practically nil, as far as ultimate mortality is concerned, and although no distinction has been drawn between " alive and well " and " alive but ill," a detailed examination of these subdivisions gave identical results. The table of deaths taking place within two years is given to show that a reasonable degree of finality was attained by taking an after-history of 4–5–6 years. It shows also that the immediate significance of slight hæmoptysis in non-bacillary cases is nil. Now in non-bacillary subjects, particularly in the early stages, we are dealing with a group closely related to " suspect " and " contact groups," and to all cases in which diagnosis is a matter of considerable doubt, including most of those in which an actual lesion had healed with great rapidity. It seems, therefore, that, in estimating from a history of hæmoptysis the chances of any given lesion being an active one, no great stress should be placed on a history of blood-streaked or bloody sputum.

NON-TUBERCULOUS OR SPURIOUS HÆMOPTYSES.

We must now consider various non-tuberculous sources of hæmoptysis or spurious hæmoptysis, with particular reference to the existence of " colour." Some observers have detailed as many as 41 different causes of hæmoptysis, but emphasis will be laid here only on reasonable sources of doubt in history. These are :—

I. *From Upper Air Passages.*—This is a frequent source of difficulty, the more so that the blood is, as a rule, small in amount. Garel and

Gignoux[15] state that varices at the base of the tongue, pharyngitis, and laryngeal and tracheal congestions are frequent causes. Of 128 non-tuberculous cases, they found 69 due to varices and 3 to pharyngitis, and they believe that frequent spitting of small quantities of blood without much cough suggests the upper air passages. The quantity varies, but may sometimes be copious. Collier[16] describes a case of post-nasal polypus giving rise to spitting of quantities of blood, severe cough, emaciation, etc. Other conditions mentioned are small perforating ulcer of soft palate (Thompson), nasal mucous membrane, pharynx, gums, pyorrhœa following plumbism or iodism, scorbutic condition of throat mucous membrane, ulceration of tongue (Powell and Hartley), streaks due to irritated throat (Cabot[17]), ulcerations of larynx or trachea (Hare[18]), naso-pharyngeal catarrh (Cruice[19]).

II. *From smaller Air Passages and Lungs.*—One of the common causes of hæmoptysis in phthisis, apart from local affections of the blood vessels, is active hyperæmia, and we must therefore take into account other non-tuberculous causes of congestion. Minor says that hæmorrhage may arise from any form of pulmonary congestion, and Bonney, as we have already noted, says that expectoration of blood-stained mucus from congestion of bronchial mucosa has but slight significance. Osler[20] and Fowler mention active or passive hyperæmia in arthritic subjects over 50; von Jaksch[21] refers to persistent hyperæmia; Eastman says the hæmorrhage from pulmonary hyperæmia may be profuse and even fatal; Dieulafoy mentions bronchorrhagia due to strains or chills, and Hay[23] reports recurrent hæmoptysis of angioneurotic origin.

For the sake of convenience we may note here the effect of violent exertion, either from running, dancing, physical exertion, using wind instruments, reflex coughing, etc. It is well known that streaks of blood may occur during whooping cough, and it follows that many other slight hæmoptyses following physical over-exertion may have an innocent cause. Cornet puts some stress on these conditions, and it is interesting to note from the widely quoted figures of Stricker for the Prussian Army that 25 per cent. of hæmoptyses following moderate exercise were non-tuberculous, and 50 per cent. of those occurring after severe exercise. The writer has notes of 5 cases in which hæmoptyses occurred after severe exercise, usually slight in amount, but in one case ten ounces, in which 5–10 years after no disease had developed. It is commonly observed that streaks of blood may occur in most varieties of bronchitis, although in emphysema it is said to be rare (Fowler), as also in asthma (Powell). Williams, Bartlett, and Cruice quote cases of repeated hæmoptysis during bronchitis and emphysema, and Lord[22] a series of cases of influenza also with recurring attacks of bleeding. It is important to note that cases of collapse-induration, already suspicious by reason of their apical situation often give a history of blood-streaked sputum (Fishberg[24]). Whilst less importance should be placed on familiar gross lesions of the lung, which ought to give little diagnostic trouble on account of their extent, this does not apply to the early stages of such diseases, and particularly not

to bronchiectasis. We know that bronchiectasis may be apical, and that it is as often as not one-sided. Dieulafoy states that hæmoptysis is frequent in this condition; Fowler reported it in 14 out of 35 cases, the hæmorrhage in several cases being profuse and repeated, whilst in three only was there any tuberculosis; and Powell and Hartley observe that it is possible to have aneurysm in bronchial dilatations. According to the latter observers hæmoptysis is rare in pulmonary syphilis, but this is by no means the writer's experience, and Stanley[25] noted it in most of his cases.

In malignant growths of the lung, hæmoptysis, according to Roberts and Perkins,[26] is the earliest symptom in 72 per cent. of cases, and Dieulafoy makes the same observation. In the pulmonary cirrhosis hæmoptysis is frequently present (Dieulafoy), and needless to say in pneumoconiosis it is a particularly perplexing feature. Despite the rarity of the conditions the same must be said of aspergillosis, especially the mycotic forms. Hæmoptysis, says Dieulafoy, is not rare in interlobar pleurisy, which is frequently non-tuberculous. The remaining conditions need merely be tabulated without comment, abscess, gangrene, hydatid and dermoid cysts, mediastinal glands, broncho-pulmonary lithiasis, distomiasis, etc.

III. *Secondary to Gross Disease elsewhere.*—As with active hyper-æmia, passive congestion of the lungs may give rise to hæmoptysis varying from blood-streaked sputum to sometimes a pint of blood. Heart disease, especially mitral stenosis, is one of the commonest causes of this condition. When the signs of congestion are well marked, this may not give rise to much difficulty in differentiation, but we know that the signs of lung involvement, secondary to cardiac insufficiency, may sometimes be limited to an apex, with impaired percussion note and fine crepitant râles. Fishberg says that such cases have given him more difficulty than any other non-tuberculous apical lesion, and he noted that of 38 mitral cases examined within six months, five gave a history of bloody sputum and one had a profuse hæmorrhage. Hirtz [27] refers to the difficulty of distinguishing the bronchitis of heart or kidney disease, and Curtin [28] reports two such cases with hæmoptysis. Powell and Hartley, Bonney, Cruice and Bartlett also refer to the streaked sputum found in pulmonary œdema. Hæmorrhagic infarct and aneurysm give rise to hæmoptysis, which may be persistently recurrent and vary widely in amount. Arterio-sclerosis and increased pulse-tension have been noted by some observers as causing hæmoptysis, Havilland Hall [29] gives five cases in which an occasional profuse hæmo-ptysis could be attributed to the condition of the vascular system, and quotes Clarke [30] on four similar cases. The hæmoptysis occurs in middle age or after, and probably bears some relation to the arthritic hæmoptyses described by Osler in subjects over 50. Congestions due to Bright's disease or cirrhosis of the liver may also cause bleeding from the lung. Garel and Gignoux describe two such hepatic cases, and ten in which albuminuria was present; five more were associated with gout and seven with diabetes. In severe anæmia, leukæmia, and purpura, varying degrees of hæmoptysis may occur. Powell and Hartley say that in

anæmia the bleeding arises through slow transudation, and Cornet mentions diapedesis as a cause of spots or streaks of blood in the sputum.

IV. *From Hysteria, Menstruation, or unknown Causes.*—We have reserved this group for the last, because in each instance the description of the hæmoptysis has depended on a negative after-history and because it is, at any rate, probable that many of them were due to rapidly-healing tuberculosis, Cornet states that hysterical individuals not rarely have bloody sputum periodically with no disease in the lung. Dieulafoy gives hysteria as a cause of bronchorrhagia. Pende [31] describes one doubtful case, and Garel and Gignoux report 12 cases of nervous origin out of 128 non-tuberculous hæmoptyses. The difficulty of excluding tuberculosis in cases of vicarious menstruation is great. That there is a congestion associated with menstruation is the experience of most sanatorium officers, who note again and again small hæmoptyses in the pre-menstrual or menstrual period, and it is not improbable that this congestion may give rise to streaks with the non-tuberculous. Osler thinks the condition has been well authenticated, and Cornet, Bonney, Martinet,[32] Eastman, Garel and Gignoux give what they consider authentic cases. Finally, Garel and Gignoux could find *no* cause for 14 per cent. of 128 non-tuberculous hæmoptyses; Ware [33] found 16 per cent. of 382 hæmoptyses without any definite cause and without any tuberculous sequelæ, chiefly in young and seemingly healthy persons; Abrams [34] records 14 cases healthy as many as 15 years later.

Statistical Aspect of Non-Tuberculous Hæmoptyses.—There is practically no accurate evidence as to the incidence of all hæmoptyses previously detailed, but however uncommon diapedesis may be as a source of bleeding, conditions such as pharyngitis, bronchitis, bronchiectasis, etc., cannot be said to be rare. In spite, however, of the number of common complaints which may cause hæmoptysis, especially streaks of blood, most observers harp on the one string that every bleeding should be suspected (and some say given sanatorium treatment) until proved to be non-tuberculous. This is scarcely logical, nor is it justified by after-histories.

HÆMOPTYSES IN BENIGN TUBERCULOSIS.

Even if it were true that 90 per cent. of all hæmoptyses are tuberculous in origin, this would not be of much assistance in proving that at a subsequent examination active lung disease is present, in view of the fact now widely known that many lung lesions heal with startling rapidity. This type of disease, the so-called " tuberculose abortive " of Bard has been investigated by various writers, Piery,[35] Bezançon,[36] and de Jong, Sabourin,[37] Tripier,[38] and Fishberg,[39] amongst others. It is characterized by a mild attack, with few symptoms and physical signs, which heals permanently within 4–12 weeks. The writer[40] has recently reported a series of cases in which the same rapid and permanent cure took place within three months of a positive bacillary find.

It is presumed that in the majority of cases the disease escapes

recognition on account of the paucity of signs, and this is supported by the fact that hæmoptyses may occur of considerable size without any signs of disease. All observers describe hæmoptyses as a symptom of "*tuberculose abortive*," and Piery gives three types: (1) a single initial hæmoptysis sometimes severe (*hæmoptysie d'alarme*) with at no time any other symptoms or physical signs; (2) cases with quite definite symptoms and physical signs in which slight hæmoptysis occurs usually over a few days, varying in amount from streaks to a few spoonfuls; (3) a third aberrant type in which recurrent hæmoptysis may take place at intervals of several years without any manifestation of disease whatever.

This benign type adds an uncertain element to the value of a history of hæmoptysis, and the writer has examined the records of 100 consecutive cases which, although admitted to sanatoria for treatment, seemed on admission to have little sign of active disease. In all cases, despite even a positive bacillary find prior to admission, the following examinations were carried out: Sedimentation examination of the sputum and the administration of subcutaneous doses of tuberculin up to ·01 cc. A.F. (Bandelier's scale); in most instances, too, the opsonic index was estimated and the complement fixation reaction.

In 27 instances a history of hæmoptysis prior to admission was obtained, in 10 cases within a period of two months, and Table II. (*see* page 108), indicates the results of detailed examination.

It will be seen that only 7 of these cases showed signs of activity on admission, five were quiescent and probably arrested, although in four T.B. were found before admission, and in the fifth the complement fixation reaction was positive. Fifteen gave no evidence of disease of any kind, unless we are to consider some impairment of the right apex and alteration of the breath sounds are signs of disease. Such impairment was present in 6 cases out of the 15 negatives. In the light of after-events, the history of hæmoptysis was misleading in half of the total number of doubtful cases, and even when it was not misleading it could frequently have been ignored (5 of the 12 positive cases were probably arrested on admission). It is possible that the number of " arresteds " might have been increased, had more careful sputum examinations been carried out prior to admission, but even if this conjecture is accurate, the fact still remains that they were " arrested " on admission. The selection of cases was mostly from the middle classes of society, and the whole of the 100 " doubtfuls " examined constituted only about 18 per cent. of the total admissions during the same period. Making due allowance for these facts, it is nevertheless plain that not only are many cases diagnosed wrongly as tuberculous on the strength of hæmoptysis, but that many cases of tuberculous hæmoptysis may heal with such rapidity as to discount largely the diagnostic importance of a history of bleeding.

SUMMARY.

Briefly the significance of hæmoptysis is as follows: Whilst slight hæmoptysis is one of the commonest forms of bleeding in pulmonary tuberculosis, non-tuberculous hæmoptysis is .also most commonly

slight. The number of slight non-tuberculous hæmoptyses is very large, and in any case, even when a tuberculous lesion is the cause of bleeding from the lung, rapid arrest often occurs.

TABLE II.

Showing the ultimate Diagnosis in 27 Doubtful Cases giving a History of Hæmoptysis.

| No. | Hæmorrhage. | | Sputum. | | | Tuberculin Reactions. | | | Ultimate Diagnosis. |
	Approximate Amount.	Date from Admission.	Before Admission.	On Admission.	On Dismissal.	Focal.	General.	Serum Reactions.	
		Months.							
I	℥vii	1	+	—	—	+	+	+	Tuberculosis: active.
2	Streaks	3	+	—	—	—	+	—	Tuberculosis: arrested.
3	,,	2	+	—	—	—	±	—	,, ,,
4	℥iv	6	+	—	—	—	—	—	,, ,,
5	℥i	3	+	—	—	—	—	—	,, ,,
6	℥x	2	—	—	—	+	±	+	Tuberculosis: active.
7	℥ii	3	0	0	—	+	±	±	,, ,,
8	Streaks	2	—	—	—	+	+		,, ,,
9	,,	5	0	0	—	+	+	+	,, ,,
10	℥ii	3	0	—	—	—	—	+	,, ,,
11	℥i	3	—	—	—	+	+	±	,, ,,
12	Streaks	4	—	—	—	—	+	—	Negative.
13	,,	3	—	—	—	—	+	—	,,
14	℥i	4	—	—	—	—	+	—	,,
15	Streaks	6	—	—	—	—	+	—	,,
16	℥i	4	0	0	0	—	+	—	,,
17	Streaks	2	—	—	—	—	+	—	,,
18	℥iv	9	—	—	0	—	+	—	,,
19	Streaks	15	—	—	—	—	+		,,
20	℥i	4	—	0	—	—	—	—	,,
21	Streaks	2	—	—	—	—	—	—	,,
22	℥i	4	—	—	—	—	—		,,
23	Streaks	1	—	—	—	—	+	+	Tuberculosis: arrested.
24	℥i	24	—	—	—	—	+	—	Negative.
25	Streaks	6	—	—	—	—	—	—	,,
26	,,	4	—	—	—	—	—	—	,,
27	,,	2	—	0	0	—	—	—	,,

When the signs are as a whole of doubtful import, it is an open question whether a slight hæmoptysis is indicative of active disease or not, or for that part of it whether it is indicative of tuberculosis at all. On the other

hand, when a moderately large or a severe hæmoptysis takes place and *other gross causes are excluded,* the probabilities are that the lesion is tuberculous and, in most instances, actively evolutive, the exceptions being cases of rapidly healing or " abortive " tuberculosis. This, however, cannot be ascertained without the employment of specific methods of investigation either by serum reactions or by the use of subcutaneous doses of tuberculin, and until some such methods of examination are adopted an open mind must be maintained. Hæmoptysis does not contra-indicate test injections but it is an indication for careful dosage.

REFERENCES.

1 Powell and Hartley : *Diseases of the Lungs,* 1911. 2 Bartlett : *Bost. Med. and Surg. Journ.,* December 21, 1911. 3 Thompson : *Consumption in General Practice,* 1912. 4 Caillé : *Differential Diagnosis and Treatment of Disease,* 1906. 5 Minor : Article in Kleb's *Tuberculosis,* 1909. 6 Bonney : *Pulmonary Tuberculosis,* 1910. 7 Cornet : *Tuberculosis,* 1904. 8 Kidd : Article in *Allbutt's System of Medicine,* Vol. V., 1909. 9 West : *Diseases of Organs of Respiration,* Vol. II., 2nd ed., 1909. 10 Dieulafoy : *Text Book of Medicine,* Vol. I., 1912. 11 Roepke : *Deut. med. Woch.,* Nos. 41, 42, 51, 52, 1911. 12 Abraham : *Inaug. dissert., Erlangen,* 1893. 13 Barnes : *Journ. Amer. Med. Assoc.,* February 16, 1907. 14 Elderton and Perry : *Drapers' Co. Res. Memoirs,* VIII., 1913. 15 Garel and Gignoux : *Med. Rev.,* 189, 1912. 16 Collier : *Med. Press and Circ.,* II., 634, 1913. 17 Cabot : *Physical Diagnosis,* 1913. 18 Hare : *Osler and McCrae's System of Medicine,* Vol. II., 1912. 19 Cruice : *New York Med. Rec.,* August 24, 1912. 20 Osler : *Practice of Medicine.* 21 von Taksch : *Clinical Diagnosis,* 1905. 22 Lord : *Osler and McCrae's System of Med.,* Vol. II., 1912. 23 Hay : *Med. Press and Circ.,* September 29, 1909. 24 Fishberg : *New York Med. Journ.,* July 5, 1913. 25 Stanley : *Brit. Med. Journ.,* II., 802–1911. 26 Roberts and Perkins : *Allbutt's System of Medicine,* Vol. V., 1909. 27 Hirtz : *Le Monde Médical,* 2, p. 360, 1911. 28 Curtin : *Trans. Am. Med. Assoc.,* September 14, 1901. 29 Havilland Hall : *Lancet,* August 14, 1915. 30 Clark : *Lancet,* October 26, 1889 (quoted Hall). 31 Pende : *Policlinico,* October 8, 1904 (abst. *Semaine Médicale,* December 7, 1904). 32 Martinet : *La Presse Médicale,* August 14, 1909. 33 Ware : quoted Hare (*Osler and McCrae's System of Medicine*). 34 Abrams : *St. Louis Med. Fortnightly,* January 10, 1913. 35 Piery : *La Tuberculose Pulmonaire,* Paris, 491, 1910. 36 Bezançon et de Jong : *Rapp. de la Soc. d'Etudes sur la Tub.,* mai 14, 1908. 37 Sabourin : *Revue de Médecine,* No. 3, 1903. 38 Tripier : *Traité d'anatomie pathologique générale,* 1904. *Internat. Cong. on Tuberculosis,* Washington, 1908. 39 Fishberg : *Medical Record,* May 24, 1913. 40 Glover : THE PRACTITIONER, November, 1916.

THE MANAGEMENT OF AN EPIDEMIC OF DIPHTHERIA.

By FRANCIS H. KELLY, M.B., B.S.

Late House Physician, Middlesex Hospital, etc.

My object in describing this epidemic, which occurred in a public school containing about 200 boys, is to compare the various measures that may be adopted in order to endeavour to prevent the spread of the disease. The experience gained in controlling an epidemic in a school is naturally applicable to any community where a number of individuals are domiciled together.

The first case occurred on October 20, in a boy who had apparently simple follicular tonsillitis, with no clinical appearances suggestive of diphtheria. The culture from a swab taken from the throat, however, contained the Klebs-Loeffler bacillus. From thence onwards cases occurred at irregular intervals, which in some were as long as a fortnight, up to the end of April of the next year. In all there were 14 cases, all of them boys, who had a definite membranous sore throat, characteristic of diphtheria. In none of these cases did the patient state that he had had a sore throat for more than 36 hours before coming under treatment. The dose of antitoxin given to these cases varied from 8,000 to 12,000 units, and in every case the temperature was normal in 48 hours. In no case was there paralysis or other complication with the exception of a few serum rashes.

The whole school, including staff and attendants, was swabbed on three occasions, and in addition all were swabbed before their return to school at the end of April. As the result of this, 49 carriers, 45 of whom were boys, were discovered. About half a dozen of these stated that they had slight sore throats, but showed no signs suggestive of diphtheria. Only one boy developed clinical diphtheria, in whose throat the organisms were found as a result of a general swabbing of the whole school. He developed it two days after the swab was taken. About half the positive cases were treated by means of a prophylactic injection of antitoxin, and about half were not. A 1 in 40 solution of potassium chlorate was used as a gargle in all cases. The positive swab cases were perforce, owing to lack of accommodation, isolated with those recovering from clinical diphtheria. As will be seen from the above description, no cases of diphtheria resulted. The average time taken for an individual who had given a positive result to become negative was about five weeks.

No particular source of infection could be discovered. The usual steps in regard to examining and rectifying any defects in the sanitary

system of the school were taken. Tabular lists were made out classifying the boys in forms, in dormitories, according to their seats in chapel, etc., but all with negative results. The epidemic was eventually stopped by the school having to be broken up by order of the M.O.H. of the district. A certificate that a negative result had been obtained was required in the case of each individual before he was allowed to return to school. In this way eight carriers were discovered. Any boy who had at any time previously had a positive result was made to gargle with potassium chlorate for one month after his return to school.

The special points of interest about this epidemic, which I believe is somewhat similar to many others occurring recently under similar circumstances, would appear to be :—

1. The entire absence of serious cases. This I attribute largely to the fact that the school organization enabled the boys to be caught early in the disease. Perhaps a little may have been due to the rather large (considering the nature of the cases) dose of antitoxin used.

2. The very large proportion of cases which gave a positive result, but no clinical signs. These cases outnumbered those of true diphtheria in the proportion of 7 to 2.

3. The complete failure of the swabbing of the whole school as a means of checking the epidemic.

In the light of these results it would appear that the methods usually advised for dealing with such an epidemic are unsatisfactory. Before examining them in detail there is one point which should be mentioned, because it is not even now sufficiently realized. That point is the extremely mild form taken by the disease when properly dealt with. By properly dealt with, I mean that steps shall be taken to ensure that every case, after the first one, shall come under treatment within the first 24 hours of the disease. Under such circumstances I do not think that I am exaggerating my case if I say that at a guess the mortality in a well managed school should be somewhere under 1 in 200, the cases of real clinical diphtheria only being counted. In epidemics of any disease at a school there is some risk, no matter how slight it may be, and I do not think that when proper care is taken that from diphtheria should be very much, if at all, greater than that from, say, measles, while it should certainly be less than that from scarlet fever.

Let us examine in order the various measures that may be adopted so as to check such an epidemic in a similar institution. These are :—

1. To close the school. This is obviously a last resort and a confession of failure. The school authorities are naturally averse to it, the parents are frightened and may take their boys away, and, lastly, but by no means least, the disease may be spread all over the country. It is a measure, therefore, which should certainly not be adopted unless examination proves the sanitary system of the school

to be very seriously defective.

2. To give a prophylactic injection of antitoxin all round.   To this course I am strongly opposed, on the following grounds :—

(a) The immunity produced only lasts for at most three weeks, and this measure has no effect in reducing the number of carriers.   When, therefore, other cases develop, as they are practically bound to do, as soon as the period of passive immunity has elapsed, one is faced with the probability that anaphylaxis will occur, when more antitoxin is given in the treatment of these cases.   In other words, a pro-phylactic injection of antitoxic serum, when given to the members of a large community, does nothing to stop an epidemic ; it merely puts off the evil day when the trouble has to be met, and makes it more difficult to meet when that day does come.

(b) The occurrence of serum sickness among a proportion (say, 30 per cent.) of a large community constitutes in itself a fairly severe epidemic, and is a great inconvenience to the community generally.   Also, looking at it from the selfish point of view, it is particularly undesirable that the doctor should be the cause of the said inconvenience.

(c) The expense involved.

3. To take a swab from the throat, or throat and nose, of every member of the community.   Of course, if an inspection of the school lists, etc., leads one to think that the disease is emanating from a certain quarter, then it is obvious that the right thing is to swab the section of the community affected.   I am assuming, however, for the purposes of argument, that no such incidence on any special section can be found.   Under these circumstances, the advantages of taking a swab from every member of the school seem at first sight so obvious as to be hardly worth debating.   Theoretically, one should be able to pick out all the criminals harbouring the bacillus, isolate them, and so stop the epidemic.

In practice, let us see what happens.   First of all, it must be remembered that the Klebs-Loeffler bacillus has to be allowed to grow for from 16 to 20 hours on a culture medium before it can be identified.   If to this we add the time taken in making a bacterio-logical examination of a large number of cases, and the time taken in sending the swabs to the laboratory, it will generally be found that 36 to 48 hours have elapsed from the actual taking of the swabs to the receipt of the complete results.   What naturally happens in this interval is that the carriers have infected other carriers, which can readily be proved by a subsequent swabbing, and thus the epidemic goes merrily on, while one has the additional worry of a large number of individuals on one's hands who have to be isolated, and who are perfectly well, but refuse for many weeks to become free from

infection.

For this reason I am strongly opposed in general to the swabbing of a whole school, an additional disadvantage of which is the state of scare which it engenders. There is only one way in which swabbing the whole of a school might have a reasonable chance of stopping an epidemic, though I fancy there are very few authorities who would sanction it. That way is to take swabs from the throat and nose of every individual on four successive days. The labour and expense would be terrific, but it would probably effect a cure if it were thought worth while to adopt it.

4. The last method that may be adopted is the somewhat revolutionary one of neither giving prophylactic doses of serum nor taking swabs, but of simply adopting local remedies for the nose and throat. As will have been seen from the description of the epidemic, a large number of carriers quite unprotected, except by the use of a gargle, were mixed up with cases recovering from true diphtheria, but in no case did diphtheria develop. It seems, therefore, that the use of suitable local remedies is sufficient, except possibly in a very few cases, to prevent the disease developing. The local remedies I would suggest are gargling twice a day with a 1 in 40 solution of potassium chlorate, and douching the nose once a day with a solution of sodium chloride, sodium bicarbonate, and borax in a strength of 1 in 200 of each. Every member of the school should be made to adopt these precautions. The saving of trouble and expense, and the avoidance of scare are all in favour of this method of prophylaxis. More important still is the aggregate saving of time for a number of individuals who would otherwise lose it while they were in isolation. The number of true cases, and, consequently, the chances of a fatality, should certainly be no greater than, if so great as, when the more usual measures are adopted.

Whatever method is adopted there can, I think, be no doubt that every individual should bring back with him a certificate that a negative result from a swab has been obtained before being admitted to the school. Also, it is distinctly advisable that all who have suffered from the disease, or who have given a positive result during the holidays (followed by a negative before their return) should be made to adopt a course of local treatment for at least a month after their return to school.

THE " DARN AND STAY-LACE " METHOD FOR THE RADICAL CURE OF INGUINAL HERNIA.

Mr. CHARLES BENNETT, of Glasgow, writes :—

"In the June number of THE PRACTITIONER is an article by Mr. W. Sampson Handley entitled ' A Method for the Radical Cure of Inguinal Hernia (Darn and Stay-lace Method).'

The method of darning with silk in hernia operations has been in use by me in the Western Infirmary, Glasgow, and is referred to in an article which appeared in the *Glasgow Medical Journal* for September, 1917. In that article, entitled ' Inguinal Hernia,' I examined the work and opinions of a number of surgeons on hernia in general, and took the opportunity of outlining the method which I termed ' darning,' and which I had found effective in direct inguinal hernia. After discussing Davis's operation of pulling down a portion of the rectus muscle and fixing it to Poupart's ligament, I proceeded :

> ' Some such procedure is necessary, inasmuch as at the inner end of the ligament too great tension results when it is attempted to pull down the conjoined tendon. On several occasions the writer has inserted strong silk sutures through Poupart's ligament, rectus sheath edge, and conjoined tendon ; then, without drawing them too tight, has " darned " the opening. The results have been quite satisfactory. It has been known for some time, of course, that silk, embedded in the tissues, acts as a basis for the building up of fibrous tissue.'

Thus concisely put, but with sufficient fulness for the expert surgeon, was the principle and basis of Mr. Handley's operation.

Mr. Handley may, of course, have devised the method independently, but I am bound to claim the ' darning' method by right of priority in publishing it."

(*Note.*—It is only fair to Captain Handley to explain that his article in the June, 1918, issue of THE PRACTITONER was based upon a clinical lecture which he delivered at Middlesex Hospital on July 17, 1917. Obviously, therefore, he could have had no knowledge of Mr. Bennett's publication which occurred nearly two months later. The delay in publishing Captain Handley's paper occurred owing to the great pressure on our space, and also to the difficulty— caused by war conditions—of getting the illustrations satisfactorily drawn.—*Editor*, THE PRACTITIONER.)

Practical Notes.

SANDAL-WOOD OIL IN THE TREATMENT OF GONORRHŒA.

Gougerot draws attention to a book lately published, in which Paul Vidal shows that sandal-wood oil, given in large doses, is a specific in the treatment of gonorrhœa, to just the same extent as there are specifics for the treatment of syphilis and malaria. Up to the present, this drug has nearly always been given in too small doses or at the wrong stage. For its successful use as a specific in gonorrhœa two conditions must be fulfilled—one of dose and the other of absorption. Vidal gives a daily dose of from 5 to 6 grammes net weight. In order that the drug may be tolerated, and that the frequently severe lumbar pain caused may be avoided, he insists that the dose must never be taken during the two hours preceding a meal, during the meals themselves, nor in the hour subsequent to these. The oil must be of guaranteed purity and in large capsules. Small capsules should never be given, for a large number is then necessary, and the gelatin containers are indigestible. He states that the specific effect is due to the fact that the gonococcus never becomes inured to the drug, whereas all antiseptics, whether used externally or internally, lose their effect in a few days. All forms of gonorrhœa, acute and chronic, and its complications are benefited by large doses of the drug, but in differing degrees. It acts very much more effectually the more recent the infection, before the coccus has had an opportunity of establishing itself in the glands and being surrounded by fibrous tissue.

Acute Urethritis.—The treatment is begun on the first day. The drug is given in large capsules containing 1 g. net of the oil, a weight of about 1·50 including the gelatine capsule. The doses are given so that the capsules are absorbed at least two hours before a meal and at least an hour after. The first capsule is taken at 6.30 a.m. in the case of a soldier, with réveille at 5 a.m.; the second at 8 a.m., two hours before breakfast at 10; the third at mid-day; the fourth at 3 p.m., dinner being at 5 p.m.; the fifth at 7 p.m.; and, if possible, a sixth at 9 p.m. These doses are continued daily for from 15 to 20 days. From the 15th to 20th day, or from the 20th to the 25th, the dose is reduced to 4 g.; to 3 g. from the 20th to the 30th; and then to 2 g. from the 30th to the 40th. Local treatment is of useful assistance, but only provided that the surgeon can carry it out himself or by a properly trained assistant. It is not indispensable. The patient can continue to follow his usual course of life. Recovery is often noted as apparently complete by the tenth day, but the treatment must be kept up, for relapses are induced by very slight causes.

Chronic Urethritis.—At this stage it is difficult to destroy the causative agent, which has become sheltered by more or less deep induration. Recovery can only be assured by persisting in the treatment, which must be modified in such a way as to allow prolonged ingestion, and by the use of adjuvant methods of treatment. The first is obtained by giving large doses, 6 and 7 g., for eight days, then resuming after an interval of eight days. The second is promoted by the usual massage of the urethra with the help of a sound, so as to disperse the exudations, empty the glands of their cocci, and improve the condition of the tissues. As a rule, carefully carried out, this is sufficient. but it is sometimes necessary to take further measures—instillation of nitrate of silver or protargol, massage of the prostate, dilatations, cauterizations or

galvano-cautery through the urethroscope. In any case the large doses of the drug must be continued, so as to bring it to bear upon the acute effects set up by massage and dilatations.

Complications.—In these the effect of the drug is considerable. Orchitis and cystitis yield to its influence in a few days. Vidal declares that the same effect is produced upon arthritis and ophthalmia. In every case the treatment should be instituted at the earliest possible moment.

Gougerot has adopted this method of treatment in his military work. It is practical and simple, is frequently successful without resorting to local treatment, and interferes in no way with the soldier's duties. Vidal states that the drug may be used as a prophylactic. Some oil is expressed from a capsule into the urethra through the meatus, and one or two capsules are taken internally.—(*Journ. des Praticiens*, June 1, 1918.)

BOVERI'S REACTION IN MENINGITIS.

This reaction is obtained by adding to 1 cc. of cerebro-spinal fluid, in a small test-tube, an equal amount of a 1 per cent. solution of permanganate of potash. If the fluid is pathological, it becomes yellow; if it is normal, the violet colour remains unchanged. The test can be made by mixing the two liquids together, or by pouring one carefully on to the surface of the other so as to obtain a narrow zone of contact. The reaction is *intense* if it is produced in 2 minutes, *medium* if in 3 to 4 minutes, *slight* if in 5 to 10 minutes, and *negative* if delayed longer than this. Chiaravalotti, in *La Pediatria*, reported on 26 cases in which the test was made, and was convinced of its value owing to its very great simplicity and its quickness in yielding results. The intensity and the quickness of the reaction are proportional to the amount of albumen contained in the cerebro-spinal fluid. An amount of 3 per cent. of albumen produces the reaction in a few seconds whilst one of 0·40 to 0·15 requires ten minutes.—(*Journ. des Praticiens*, June 8, 1918.)

GASTRIC ULCER.

Professor Chauffard points out the main lines of the treatment to be adopted. This is based upon milk diet. The first addition to milk should be rice boiled in water, for it is very nutritious and never gives rise to any pain, when it has been thoroughly cooked, so that the grains are burst open and well plumped out. Patients take it willingly, when they find that it causes no pain. Later, cooked semolina and the yolks of eggs may be added to the milk. These are borne very well as a rule, and form a curative agent of importance. Medicinally, bismuth is given for twenty days, in a dose of at least 10 g. and at most 20 g. It should be taken in the morning before rising and when the stomach is empty, suspended in half a tumblerful of water. Relief is obtained in a very few days. For purely painful conditions recourse may be made to the solutions of bicarbonate of soda and phosphates, recommended by Roux of Lausanne, or to the large doses of citrate, phosphate, and sulphate of soda used by Chauffard himself.

In the case of hæmorrhage, ice should be given, supplemented by ergotine or emetine, but Chauffard does not consider that emetine is so effectual as it is in hæmoptysis, although it is borne very well. Operative treatment for hæmorrhage is no longer in favour, but a gastro-enterostomy, carried out on the lines recommended by Roux, relieves pain and prevents relapses. It is now recognized, however, that the effect of an operation such as this, though usually very satisfactory, is simply palliative and not curative. Only complete removal of the ulcer will cure the complaint, but the percentage of results is still far too low for the operation to be undertaken except in the case of an ulcer giving rise to dangerous consequences.—(*Journ. des Praticiens*, June 1, 1918.)

Reviews of Books.

Clinical Forms of Nerve Lesions. By Mme. ATHANASSIO-BENISTY, with a
Preface by Professor PIERRE MARIE, and edited with a Preface by
E. FARQUHAR BUZZARD, M.D., F.R.C.P. 81 illustrations and 7 plates.
Pp. 235. London : University of London Press, Ltd. 6s. net.

KNOWLEDGE of nerve injuries has been much enlarged by experience
gained in the war, and the establishment of neurological centres throughout
France has given our French colleagues an opportunity of collecting observa-
tions, part of the results of which are seen in the four excellent manuals
recently issued under the general editorship of Sir Alfred Keogh. This
volume, on the treatment and repair of nerve lesions, is the first of two
which have been written by Mme. Athanassio-Benisty, who has for several
years worked with Professor Pierre Marie at La Salpétrière. The distin-
guished authoress has described clearly the anatomy, functions, and effects
of lesions of the main nerves separately, as well as combinations of these
nerves, and the results of injuries to the great plexuses. The book is pro-
fusely illustrated by diagrams and photographs of actual cases. It forms,
therefore, a convenient and complete reference book containing the results
of the most recent research on nerve injuries, and will be of great value to
all medical men who are working at this subject. Special reference may be
made to the descriptions of painful types of nerve lesions and also to the
recognition of the clinical individuality of the different nerves of the limbs.
The value of the book, indeed, is largely in the completeness of the clinical
observations. With the relatively limited knowledge of pre-war days there
was too much tendency to make the clinical picture fit the presumed anatomy.
In this book clinical observations have taken precedence, and anatomy is
interpreted from them, thus leading to a valuable increase in our knowledge
of neuro-pathology.

Treatment and Repair of Nerve Lesions. By Mme. ATHANASSIO-BENISTY,
with a Preface by Professor PIERRE MARIE, and edited with a Preface
by E. FARQUHAR BUZZARD, M.D., F.R.C.P. 62 illustrations and 4 plates.
Pp. 181. London : University of London Press, Ltd. 6s. net.

IN this book, which is the complement to her first volume, Mme
Athanassio-Benisty has described the methods of nerve repair as shown
by experiments on animals, and has applied the results of her researches
to war injuries of nerves. Surgical treatment is considered in detail, and
an important chapter is devoted to descriptions of orthopædic appliances,
many of which are highly ingenious and show a great advance on pre-war
apparatus of this nature. Here again we notice the exceedingly practical
character of Mme. Athanassio-Benisty's work. At the beginning of the
war operative treatment of nerve injuries was frequent, but as experience
grew it was found that the results of such methods as nerve grafting and
nerve suture were often disappointing and a more cautious and expectant
policy was adopted. It is now recognized that more than 50 per cent. of
nerve injuries are cured spontaneously without any intervention. Mme.
Athanassio-Benisty has described for each of the main nerves the indications,
based upon clinical experience, which should guide the surgeon in deciding
whether or not operative measures should be adopted. Physiopathic
affections, the " reflex disorders," " congealed hands," etc., of other authors
are described at considerable length, but Mme. Athanassio-Benisty refrains
from committing herself to an opinion on their pathology. She concurs,

however, in the view that psycho-therapeutic measures and counter-suggestion have little influence on the progress of these affections.

Hysterical Disorders of Warfare. By LEWIS R. YEALLAND, M.D. With Preface by E. FARQUHAR BUZZARD, M.D., F.R.C.P., Lieut.-Colonel, R.A.M.C. Pp. 252. London : Macmillan & Co., Ltd. 7s. 6d. net.

THIS book has a much more limited scope than its title suggests. It is not a general treatise on the hysterical disorders of warfare, but is a book on the treatment of hysteria by suggestion, and the great bulk of it consists of detailed descriptions of cases illustrating the methods adopted by the author. Dr. Yealland is a strong believer in the value of drastic " suggestion," and he does not hestitate to resort to such methods as locking a patient in a room (in one case for four hours) and telling him he will not leave till he is cured, or applying frequent and strong faradic currents until the patient is induced to move the paralysed limb. With these methods Dr. Yealland undoubtedly obtains a high measure of success in restoring function in cases of hysterical paralysis, aphonia, deaf mutism and similar conditions. Two criticisms may, however, be made. In the first place, these conditions can be equally readily cured by other methods without resorting to the drastic procedure adopted by the author. Secondly, the treatment is directed at symptoms only. The modern view is to regard physical mani-festations of hysteria as indications of an abnormal psychical condition, and unless the mental trauma also receives attention the treatment cannot be regarded as complete, and the patient is liable subsequently to suffer from various neuroses. Dr. Yealland ignores completely the recent develop-ments of psycho-therapy, to which suggestion, at the most, is now only an adjunct. This book does not make any addition to our knowledge of hysteria and the descriptions of cases are often tedious and verbose. Those, however, who believe in powerful suggestion as a means of treatment may gather an occasional hint from the methods described.

Studies in the Anatomy and Surgery of the Nose and Ear. By ADAM E. SMITH. M.D. Pp. 157. New York : P. B. Hoeber. $4.

THE anatomy of the nose and ear is dealt with in this work from the sur-gical standpoint. In accordance with this aim, the drawings represent the relation of parts to their natural surroundings and to the head as a whole. Six short chapters upon nasal breathing ; some suggestions on the treatment of intranasal conditions ; a contribution to the anatomy and surgery of the nose and its sinuses ; exposure and removal of the pituitary gland ; postural treatment of otitis media and mastoiditis ; and a contribution to the anatomy and surgery of the temporal bone accompany the 45 plates which form the bulk of the work. The drawings are very clear and should prove of undoubted value to clinologists. We doubt that the claim to originality for the author's postural treatment of otitis media and mastoiditis can be upheld. The book is excellently produced.

Eye, Ear, Nose and Throat. By H. C. BALLENGER, M.D., and A. G. WIPPERN, M.D. Pp. 524. New York : Lea and Febiger. 2nd edition. $3.50.

IN response to the demand for a short work for students and practitioners, the authors have rewritten almost every chapter of this volume, and have added the anatomy of the parts, with two extra coloured plates. The section upon the eye and its affections are from the pen of Dr. Wippern, Dr. Ballenger being responsible for the remainder of the book. For a small text-book, the work is an excellent one and the standard is well maintained throughout. Descriptions are clear, and wherever a good diagram or illustration can be of explanatory assistance to the text there is always one to be found.

Preparations, Inventions, etc.

CONEOSAN.

(London : Modern Pharmacals, 48, Mortimer Street, W.1.)

This method of giving concentrated intra-venous injections of novarseno-benzol was devised by Dr. Paul Ravaut. He states that the product, dissolved in a small quantity of water, may be injected, even in large doses, by means of a glass syringe without giving rise to any ill effects. The action due to the chemical and bacteriological impurities of distilled water is prevented, and the use of sodium chloride can be given up because the concentrated solutions being isotonic and hypertonic are no longer hæmolytic. More complete asepsis is ensured by discarding rubber tubes and joints. The apparatus supplied comprises an ampoule made of pure hard glass and containing distilled water, sterilized and deprived of air, a special vial of novarsenobenzol, made with a flat bottom so as to stand upright, and a suction filter. The injection is prepared by pouring the water into the vial containing the arsebobenzol. The filter is used to promote solution by stirring, and is then attached to the syringe. The solution is drawn up into the syringe through the filter, thus preventing any undissolved particles from entering the syringe. The whole technique of preparation and injection can be carried out in two minutes. The apparatus is issued with various doses : 0·15, 0·30, 0·45, 0·60, 0·75, and 0·90.

STOKE'S NASAL INHALER.

(London : Messrs. Oppenheimer, Son and Company, Ltd.,
179, Queen Victoria Street, E.C.4.)

This small apparatus is made entirely of red rubber, and of such shape that, on being introduced into the nostrils, it clips itself firmly and requires no further support of any kind. When in position, it occasions no discomfort, and can be worn for any length of time. The outer end is lightly plugged with absorbent wool, to which are added a few drops of the inhalant. Continuous inhalation can thus be kept up throughout the night without the least difficulty arising.

STERILE CHROMICIZED CATGUT.

(London : Messrs. John Bell and Croyden, Ltd., 50, Wigmore Street, W.1.)

These ligatures are prepared by Morley's process, and the aim has been to produce them completely sterile, of guaranteed strength, and accurate in gauge. We find, on careful and thorough testing, that these standards have been attained fully in every respect. Clinical experience and laboratory experiments show that the catgut is thoroughly reliable, and compares more than favourably with the foreign productions so largely in use. It will be found that the catgut persists in muscle for the time specified, and is wholly absorbed after that time. The spirit used in the tubes containing the ligatures was found to be quite sterile, and the gauge of the catgut proved to be accurate throughout the whole length.

MON-AURAL STETHOSCOPE.

(London : Messrs. Allen and Hanburys', Ltd., 48, Wigmore Street, W.1.)

This instrument has been devised by Dr. Lowenthal, of Hampstead, who has been using it with satisfactory results for some time. By its means it is possible to hear with both ears at the same time. It consists of an ordinary mon-aural stethoscope in two parts, to which is attached about 16 inches of rubber tubing. This is connected at the ear-piece, and communicates with the bore. The free end of the tubing is formed into a comfortably fitting ear-piece. In use the free ear-piece is placed in the ear further away from the side examining, and the stethoscope is used in the ordinary way. The tubing need not be removed at any time during the examination, and the stethoscope can be moved about as required. The advantages claimed over the ordinary mon-aural instrument are that both ears are engaged, that all extraneous sounds are precluded, and that the attention of the examiner can consequently be concentrated more fully. The sounds are heard more loudly, clearly, and distinctly, and it has been found very useful in examining the heart for that reason.

MAGLACTIS.

(London : Messrs. Oppenheimer, Son and Company, Ltd., 179, Queen Victoria Street, E.C.4.)

This preparation is a suspension of the hydroxide of magnesia in a minutely divided state. It is a definite chemical compound, of which 24 grs. (1·5 g.) are contained in each fluid ounce of the suspension. It acts as a most efficient antacid, and when given in acidity it relieves the pain and eructations very promptly, and removes distension without interfering with the process of digestion. It is quite unirritating, and has a mild aperient action. It has been found to be most useful in the treatment of excessive acidity in the stomach and intestines, both in infants and adults, and is particularly effectual in relieving nausea. Its state of minute division prevents the formation of concretions, and it neutralizes the acid without production of gas.

It has proved to be of special use as a mouth-wash, for it acts as an indirect antiseptic by its antacid effect, thus inhibiting oral sepsis. This effect is prolonged by a film of magnesium hydrate being deposited over the surface of the teeth, which ensures the alkaline condition in which bacterial growth cannot take place.

———◆•◆———

HEADACHES OF SINUS ORIGIN.

By Temp. Surg. WILLIAM IBBOTSON, R.N.

Surgeon, Ear, Nose and Throat Department, Royal Naval Hospital, Chatham.

The word Sinus refers to (1) the Ethmoidal Sinuses, (2) the Maxillary, (3) the Frontal, (4) the Sphenoidal, and (5) the Mastoid, including—

    (*a*) Mastoid Antrum,

    (*b*) Mastoid Cells.

Perhaps one of the commonest symptoms complained of by all patients is headache; it arises from an infinite number of causes, and though it is often easy to relieve temporarily, it is very often extremely difficult to cure and prevent. The condition, in a severe form, incapacitates its victims from doing any useful work during its duration, and often for some time after its cessation. This is an extremely important point to remember at the present time, when the critical state of the world demands clearness of vision, thought, and action on the part of every citizen.

Again, the multiplicity of the causes producing headache often demands an exhaustive knowledge and inquiry on the part of the medical attendant, who is only too often, in sheer desperation, compelled to fall back on sedative drugs. These cause such relief for the time being that the patient—ignorantly mistaking the symptoms for the cause, and then finding that his pain returns as badly as ever— soon learns to rely on his pharmacopœic friend, who, in so many cases, eventually assumes the part of a hard taskmaster, and the patient becomes the slave and victim of an insidious foe who, sooner or later, but none the less certainly, will bring him to mental and moral ruin. The cause of his catastrophe has never been attacked, and therefore no cure was possible. One of the commonest causes of headache, but one frequently missed by medical men and ignorantly neglected by patients, is inflammation affecting one or more of the nasal or mastoid sinuses. It is with the object of emphasizing the necessity for a more careful examination of the nasal, oral, and aural regions, in cases of headache of doubtful origin, that I am writing these few notes.

ANATOMY.

It would be superfluous to enter into the anatomical relations of these cavities, but one or two points are, I think, worth considering.

(1) *Ethmoidal Sinuses.*—These masses of cells lie in the upper

regions of the nose, and, in fact, inhabit the whole of the outer nasal walls above the inferior turbinals. The important points specially to note are :—

(*a*) They form the inner wall of the bony orbit, lying immediately to the nasal side of the os planum of the ethmoid bone. Therefore, any inflammation of the lateral parts of the ethmoidal cells may affect the inner wall of the orbit and the contents of this latter.

(*b*) They form the upper part of the nasal, or inner, wall of the maxillary sinuses, and are in very close relation with those cavities.

(*c*) They form the dorso-inferior boundary of the infundibula, by means of the fronto-ethmoidal cells. Now, these infundibula lead directly from the frontal sinuses.

(*d*) They lie immediately beneath, and lateral to, the cribriform plate, which forms the central part of the floor of the anterior cranial fossa.

(2) *Maxillary Sinuses.*—(*a*) Each of these lies immediately in front of the corresponding spheno-maxillary fossa, which lodges the spheno-palatine ganglion, from which arises the superior maxillary nerve, etc. Note that this nerve passes along the floor of the orbit, which forms the roof of the maxillary sinus and is composed of very thin bone, and that it emerges on to the face as the infra-orbital nerve; that, during its passage from the spheno-maxillary fossa, it gives off anterior and middle alveolar nerves, which run down inside the maxillary sinus in its anterior and lateral walls to innervate the incisor, canine, and premolar teeth, and supply branches to the lining mucous membrane of the maxillary sinus on the way.

(*b*) The roof of this sinus forms the floor of the orbit.

(*c*) The upper part of the inner wall is formed by the ethmoid.

(3) *Frontal Sinuses.*—(*a*) The anterior wall lies in close association with the supra-orbital and supra-trochlear nerves, which course on its superficial surface.

(*b*) The posterior wall forms part of the anterior wall of the anterior cranial fossa.

(*c*) The floor forms part of the roof of the orbit at its inner angle.

(4) *Sphenoidal Sinuses.*—(*a*) The roof forms the floor of the pituitary fossa, and the grooves for the cavernous sinuses.

(*b*) The optic foramina are in immediate supero-lateral relation with these sinuses on each side.

(*c*) The anterior wall is immediately in contact with the posterior ethmoidal cells.

(5) *Mastoid Sinuses* (*Antra and Cells*).—(*a*) The roof of the antrum forms a portion of that part of the floor of the middle cranial fossa known as the tegmen tympani.

(*b*) Distributed in the tissues over the lateral bony wall are the following sensory nerves: auricular branch of vagus; great auricular nerve; small occipital nerve.

Pathological Anatomy.—Perhaps the fact most frequently unrealized

is that the mucous membrane lining the mastoid sinuses is continuous, *viâ* the Eustachian tube, with that of the naso-pharynx, and so with the lining mucous membrane of the nasal cavities and the nasal accessory sinuses. In this connection, it is worth noting the relation between suppuration in a maxillary sinus and the mastoid sinuses of the same side, and instructive to consider the cause and effect of one upon the other.

POSITION AND CHARACTERS OF HEADACHE IN THE ABOVE REGIONS.

(1) *Acute Ethmoidal Sinusitis.*
   Character.—Dull, aching, often throbbing. Feeling of heaviness over bridge of nose. More or less constant.
   Position.—(*a*) Frontal, chiefly on same side as the lesion, especially if anterior set of ethmoidal cells be involved.
   (*b*) Occipital, if posterior set of ethmoidal cells be involved.

(2) *Chronic Ethmoidal Sinusitis.*
   Character.—As in (1), but much more inconstant and less acute.
   Position.—As in (1).
   Note that headache due to severe deflection of nasal septum— by no means an uncommon cause—is generally frontal in position, but sometimes occipital, and that this lesion is often associated with ethmoidal sinusitis of one or both sides.
   Note that headache, especially when associated with chronic inflammation of these sinuses, varies according to posture. Thus, it is generally worse on rising in the morning, lasting for several hours, viz., until a good proportion of the discharge which has accumulated during the night has drained away, for it is largely the tension of the contents in the diseased bony cavity which is the cause of the headache. This is well seen in the case of acute inflammation of such a cavity as the frontal sinus, for here the infundibulum—the natural exit of this sinus—becomes blocked by œdema, and the pent-up discharge accumulates until a state of tension is produced.

(3) *Acute Maxillary Sinusitis.*
   Character—Position.—(*a*) Throbbing, over site of inflammation.
   (*b*) Acute neuralgia, following the course of superior maxillary nerve after it has entered the inferior orbital fissure.
   On same side as lesion, pain referred to incisor and canine teeth, to premolar teeth, to lower eyelid, to side of nose, and to cheek and upper lip.

(4) *Chronic Maxillary Sinusitis.*
   Character—Position.—(*a*) Supra-orbital, of same side, aching, and sometimes throbbing.
   (*b*) Frontal, generally on same side as lesion, but may be bilateral.
   (*c*) Over site of inflammation.
   (*d*) Occipital, rarely.

(5) *Acute Frontal Sinusitis.*
   Character.—Generally very intense.
   Position.—(*a*) Frontal; sense of fulness and tension, with decided

throbbing. Pain is more or less constant. There is extreme tenderness over the anterior wall of the sinus, especially on pressure upwards against the floor of the sinus above the inner canthus.

(*b*) May extend to the opposite side of frontal region, especially if the other side becomes affected; or if there is only one sinus extending to the opposite side, as in a recent case of mine.

(*c*) Retro-ocular; largely due, I think, to the fact that the sinus not uncommonly dips down behind the thin roof of the orbit, forming a narrow cleft which is often of considerable depth and very hard to drain. This pain is also due, probably, to retro-bulbar neuritis, a sequela of this disease.

(*d*) Vertical.

(*e*) Occipital.

(*f*) Anterior temporal.

(6) *Chronic Frontal Sinusitis.*

Character—Position.—Much the same as in (5), but the pain is not so constant ; it is worse on rising in the morning and for a few hours later. Retro-ocular pain is common, and retro-bulbar neuritis is often present. Occipital headache appears to be more common than when associated with acute frontal sinusitis, possibly due to the fact that the posterior ethmoidal cells, and sometimes the sphenoidal sinus, have become infected.

(7) *Acute Sphenoidal Sinusitis.*

Character—Position.—(*a*) Occipital, aching.

(*b*) Frontal.

(*c*) Retro-orbital, and probably due to retro-bulbar neuritis.

It is interesting here to note the close connection between the course of the optic nerve and the natural opening for drainage of the sphenoidal sinus of the same side.

(8) *Chronic Sphenoidal Sinusitis.*

Character—Position.—Very much as in (7), but much less constant.

This lesion appears to be generally secondary to inflammation in one or more of the above sinuses, and often completes the chain of lesions known as pan-sinusitis. The site of the pain will, under these circumstances, not be typical of any one sinus. This may also be seen in the association between ethmoidal, frontal, and maxillary sinusitis, a common combination.

(9) *Acute Mastoid Sinusitis.*

Character—Position.—(*a*) Mastoid, neuralgic.

(*b*) Temporal.

(*c*) Along the jaws of the same side.

If associated with acute external meatitis, which is not uncommon, pre-auricular and auricular pain will generally be super-added.

(10) *Chronic Mastoid Sinusitis.*

Character—Position.—(*a*) Mastoid, aching and boring.

(*b*) Frontal, of same side.

(*c*) Parietal, of same side.

(*d*) Occipital, of same side.

Persistent headache, often of a boring character, sometimes associated with tenderness over the same region, and situated in the anterior or posterior parietal areas, in cases of chronic mastoid sinusitis, should always raise the suspicion of intra-cranial inflammation, especially suppuration, in the cerebellar or temporo-sphenoidal lobes of the same and, rarely, of the opposite side.

I have seen a case recently in which the radical mastoid operation had been performed, but healing in the middle ear was most unhealthy, defying many measures of treatment; exuberant granulations recurred, and became necrotic, despite treatment. Patient complained of severe attacks of pain recurring almost every night over a small area just below the parietal eminence on the same side as the aural lesion. No ocular or other symptoms or signs were found which could help in the diagnosis of the cause of the pain. There was a very strong suspicion of old-standing syphilis. Wassermann test was negative. Patient died from septic broncho-pneumonia following a severe attack of acute septic tonsilitis, and at the post-mortem examination an enormous abscess in the lateral cerebellar lobe of the same side as the aural lesion was found. I think that this symptom of headache in such a case is of very great importance, in view of the fact that in so many cases of intra-cranial suppuration there are practically no signs which appear to justify such a severe operation as exploration of the brain.

In conclusion, I would point out that during the last 12 months I have had many opportunities of examining patients suffering from headaches, the origin of which has been wrongly ascribed to causes other than those enumerated above, and treated, therefore, without success. I venture to suggest that every case of persistent headache should have not only the eyes inspected, but also the nasal, nasal accessory, and mastoid sinuses.

In many cases, there are ocular lesions to account for this symptom of headache, but in a goodly proportion of them these ocular lesions are not the primary cause but are secondary to disease of one or more of the above sinuses.

Influenza is a disease which, at the present time, is claiming many victims in Europe; and I do not think that there is any disease more calculated to leave behind it such symptoms as headache, neuritis, etc. It is well to remember that this disease commonly first shows itself as an acute catarrhal inflammation of the nose and nasopharynx. What more likely complication could we expect than sinusitis in those regions?

TREATMENT.

This is summed up in one word—*Drainage.*

MEDICAL NOTES.

By Sir THOMAS HORDER, M.D., F.R.C.P.

Assistant Physician to St. Bartholomew's Hospital, etc.

A.—METHODS AND TERMS—*continued.*

11. In examination of the thorax and abdomen, whether at rest or with respiratory movement, the important question of symmetry is often settled more accurately by inspection from the foot or from the head of the bed than from the side. The observer's eye, too, should be nearly on a level with the patient's body.

12. In auscultation of the chest, it is important to secure close and accurate apposition of the stethoscope to the skin. The object of this is to eliminate those adventitious sounds which are introduced either by a slight skating movement of the instrument on the surface of the chest, or because the whole circle of the chest piece is not making contact with the body wall. Again, it is in order to exclude extraneous sounds that the careful practitioner chooses thick-walled tubing for his instrument, and is particular to detect the first sign of any perishing of the rubber near its junction with the metal and to remedy the fault. (By their stethoscopes ye shall know them).

13. Having taken pains to eliminate adventitious sounds, as well as muscle sounds (*vide* § 6), another broad principle should be observed —to get the stethoscope as near to the bony thorax as possible. Witness the ease with which auscultation is performed in a thin man and the difficulty oft-times attending it in a fat one. Witness also the loudness of the heart-sounds heard over the præcordium of a woman whose breast and pectoral muscle have been removed by operation. It is in the observance of this principle that the following points are attended to in practice : (*a*) The patient's shoulders are thrown well back when the front of the chest is being examined, and they are made to droop when the back is being examined ; in this way, the soft parts are stretched over the thorax in as thin and even a layer as possible, and are not bunched together. (*b*) The mamma is well raised in women, and pendulous fat in both sexes. (*c*) During auscultation of the back, the scapulæ and their muscles are flattened out by bringing the patient's arms forwards. (*d*) An extra inch or two of the thorax, in a very important region, can be uncovered by asking the patient to place the hand of the side under examination upon the opposite shoulder, thus rotating the scapula outwards. (*e*) Advantage is taken of the fact that the thorax is relatively free from musculature in the axilla. (*f*) In fat subjects, the heart-sounds are often heard quite clearly in the region of the xiphoid.

14. If we speak of this principle as, in effect, an effort to get as near as possible to the organ under investigation, then it holds good also in palpation of the abdomen ; he who attends to the principle most strictly gets the most information from his examination. (*a*) The muscles are relaxed by placing the patient in a suitable posture, by securing easy breathing, by warming the hands, and by putting the

patient's mind at rest. (*b*) The bi-manual method is employed in dealing with the liver, the spleen, and the kidneys. (*c*) The genu-pectoral position is utilized whenever it is thought that an organ or a tumour may thereby fall forwards and be more easily defined. (*d*) The erect posture is adopted, if a condition of ptosis of either of the viscera is suspected.

15. Aegophony is bronchophony possessing a decided nasal quality. It was thought by Læennec to be pathognomonic of pleural effusion. "His own pupils could not follow him, nor will we." But so nearly pathognomonic of pleural effusion is it, that its presence should always lead to pleural puncture.

16. Many authors do not distinguish between the terms *apex-beat* and *impulse* in examination of the heart. This is a pity, because a different and a useful meaning can be given to each term, and, provided the strict definitions of the terms are maintained, each yields separate information. The apex-beat is the point on the surface of the chest, furthest downwards and outwards, at which the impulse can be distinctly felt. It is best determined by exploring the inter-costal spaces, from below upwards and from without inwards, with one finger. The impulse is the thrust of the heart against the chest-wall, produced during systole (of the ventricles). Its character is best appreciated by close apposition to the chest of the whole hand.

17. A full note on auscultation of the heart should include the features of both heart-sounds (*a*) at the apex-beat, (*b*) at the aortic base, (*c*) at the pulmonary base. By apex-beat is here meant, not the area of the normal apex-beat, but its area in the case of the patient under examination. There are several reasons for making this distinction. To mention only one : the præsystolic *bruit* of mitral stenosis is usually heard best, and sometimes only, over the apex-beat of the patient; in the latter case it may be entirely overlooked, if auscultation is confined to the position of the normal apex-beat.

18. It is surprising how often a very definite degree of hypertrophy of the left ventricle goes unnoticed. The oversight is generally due to the omission to observe carefully the character of the heart's impulse. The word "heaving" most aptly describes its character in hyper-trophy, for the term includes the three notions of (*a*) force which is (*b*) exerted over a period of time, and not suddenly, and which (*c*) leads to displacement of the thoracic wall. The word "forcible" is ambiguous, because it does not connote the time-element; it might be used with as much propriety to describe the sudden, slapping, localized impulse of mitral stenosis.

19. The best word to describe the character of the first sound of the heart in hypertrophy of the left ventricle is "booming"; the term includes the elements—low pitch, prolongation of the sound, and resonance.

20. Accentuation of the second sound at the aortic base sometimes gives it a musical character; it is then termed "ringing." If this feature is very marked, and the listener is unfamiliar with it, the sound may be taken for something adventitious.

(*To be continued.*)

RECENT PUBLIC HEALTH WORK.

By JOSEPH PRIESTLEY, B.A., M.D., D.P.H.

Medical Officer of Health, Lambeth.

FORTY-SIXTH ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD
1916–17 (MEDICAL OFFICER).

A REVIEW of the national health is still rendered difficult by the disturbances of populations due to war and to the gigantic new industries created during the war. Recorded birth- and death-rates are correspondingly untrustworthy. The report deals with certain statistical features, and gives a brief summary of the outstanding features of public health administration.

The record of 1916–17, so far as the ordinary infectious diseases are concerned, with the single exception of measles, is favourable. Smallpox has failed to gain more than a temporary footing; and even dysentery, despite the return to this country of many soldiers recovering from this contagious and relapsing disease, or as "carriers," has not spread to any considerable extent. Typhus has failed to spread though introduced, and enteric fever (typhoid) is rapidly becoming an extinct disease. Plague, too, failed to spread, though introduced on one or two occasions, and no case of cholera has even been recorded. Cerebro-spinal fever showed less activity, and acute anterior poliomyelitis has remained *sporadic*. Tuberculosis remains *in statu quo*, preventive and prophylactic work being interfered with owing to Army needs for medical officers having taken the tuberculosis medical officers away. The national scheme for the diagnosis and treatment of venereal diseases has now come into operation in a large part of the country.

Maternity and child-welfare work has greatly increased; the nation is at last beginning to realize that the truest national economy can only be secured by saving life and improving health by all practicable means. The total deaths in childhood should be capable of being reduced to one-half their present number. The infantile mortality (rate of deaths of infants under one year of age per 1,000 births) is the lowest on record.

Owing to Army requirements, the Board's staff has been materially reduced; but, with the limited staff available, much good work has been done. It became important to arrange for a systematic inspection of the principal port sanitary districts in England and Wales, not only on account of threatened introduction of infectious diseases, but also on account of the greatly increased importance of certain ports and riparian districts in consequence of war conditions. In this respect there was the closest collaboration

between the Board and the Medical Department of the Admiralty in conferences with the port sanitary authorities. A Sanitary Commission of the Allied Powers has been inaugurated, and two conferences have already been held at Paris. For the present the proceedings of the Commission are secret, but it is hoped that such proceedings will be publicly reported in full after the war.

The work in the Board's pathological laboratory has been of a routine character : cerebro-spinal fever, suspected plague, and anthrax being the subjects principally dealt with.

The work of the Board's inspectors of food naturally looms large in the report—at least in interest. There has been constant supervision of premises and methods of firms engaged in the preparation of food materials for the Army ; and, in connection therewith, arsenic-contaminated materials (such as baking powder, egg powder, and self-raising flour) were found, due to the use of impure acid phosphate of calcium (*vide* Appendix No. 2, pp. 5–9).

The depletion of the public health service has become serious, more than 500 public health officers—*i.e.*, medical officers and assistant medical officers of health, tuberculosis officers, and medical superintendents of fever hospitals—having joined the Forces. The staffs of inspectors of nuisances or sanitary inspectors have also been greatly depleted owing to the war.

With the object of further facilitating emergency vaccination, the Board issued the Public Health (Smallpox Prevention) Regulations, 1917, empowering medical officers of health of sanitary districts to vaccinate or re-vaccinate persons who have come in contact with smallpox infection and are willing to be vaccinated, lymph for the purpose being obtainable from the Government Lymph Establishment. No charge is to be made to the persons vaccinated or re-vaccinated under the Regulations.

A considerable number of cases of external anthrax were traced to cheap shaving-brushes, in some of which the presence of living anthrax bacilli were demonstrated. The lesion in nearly all the cases was situated in the shaving area of the face and neck. Civilians and soldiers were affected. The brushes were of imitation badger hair with bone handles ; and this hair was found, on investigation, to consist in great part of Chinese horse-hair, which had not been disinfected before being manufactured into brushes, or, at least, had been inefficiently disinfected.

A review of the position as to the administrative control of tuberculosis is given on pp. xx to xxx of the report, and summarizes the methods of prevention at present in vogue, showing incidentally how the institutional treatment of the disease has failed both in regard to kind and amount of such institutional treatment. Chronic and advanced cases of phthisis call for attention in regard to institutional treatment, which is as necessary from the point of view of the patients themselves as from the point of view of the protection of " contacts." Provision of such institutions on a *considerable* scale is urgently needed. Housing and institutional treatment cannot properly be

regarded as alternatives. They are necessary complements to each other. Without proper and sufficient institutional treatment, tuberculosis will continue to spread in the homes of the patients, and this, too, despite the housing question ; but, on the other hand, there is need for housing reform from the point of view of the public health generally, and incidentally from the point of view of tuberculosis and the susceptibility to that particular disease amongst persons living under crowded and insanitary conditions.

DRIED MILK AND MILK POWDERS.

An interesting series of reports has been published under the auspices of the Local Government Board, dealing with dried milks, with special reference to their use in infant feeding. The manufacture of dried milks is an industry of considerable magnitude, and the Board's views are specially welcome at the present time. The main report on dried milks devotes two sections to the history of the manufacturing process, and the methods of preparation and conditions of manufacture, the methods of distribution and sale, packing, varieties, brands, commercial use, etc. Other sections deal with the physical and chemical characters, the bacteriology, and administrative considerations.

The net result of the investigations is that dried milk is a valuable food, and one that possesses certain special advantages which are likely to lead to its use being greatly extended in the future, the advantages being (1) portability, (2) keeping properties, (3) convenience and freedom from waste, (4) freedom from bacteria, and (5) economy. The value of the dried milk as food is specially evident in connection with the feeding of infants in those cases in which breast-feeding is impossible, being, in such cases, one of the most generally useful of all the available preparations of cow's milk; it must be understood that the dried milk is of recent manufacture, made carefully under hygienic conditions from a good quality milk, and carefully packed and stored. Whilst dried milk may be successfully used in the rearing of sound and healthy infants—being, in this respect, almost as good as pure, clean, fresh cow's milk—it is markedly of value for sickly children suffering from marasmus, digestive troubles, vomiting, etc., and even from *slight* attacks of diarrhœa (the dried milk being, however, contra-indicated in *severe* attacks).

Compared with boiled milk, sterilized (or pasteurized) milk, and humanized milk, reconstituted dried milk is practically the same from the point of view of chemical composition. In all cases the milk constituents are altered by heating, but such alterations do not seriously affect the nutritive value of the milk. Many sanitary authorities and many welfare centres are using dried milk in consequence, on the grounds of economy as well as of suitability. Normal infants can take the full-cream dried milk, at least after the first three months of life, provided that the total quantity of food given in the 24 hours is not excessive ; but the half-cream dried milk is more suitable for infants suffering from atrophy or dyspepsia. Scurvy

and rickets are not caused by the continued use of dried milk.

Sugar should be added to the dried milk. It may be mentioned, in passing, that dried milk is of use for adult invalids and for persons who cannot take ordinary cow's milk, and may be given in any suitable concentration to suit individual requirements. Dried skimmed milk is specially valuable in certain cases of disease. The *majority* verdict of the bacteriologists in regard to dried milk is that the number of bacteria present in milk before drying is largely reduced by drying, but the dried milk itself is not absolutely sterile, the bacteria being re-introduced in the concluding stages of the drying processes.

MATERNITY AND CHILD WELFARE.

A valuable report by the Local Government Board has been published recently on the subject of maternity and child welfare, dealing with the provisions made by public health authorities and voluntary agencies in England and Wales with the direct object of promoting the health and physical welfare of expectant and nursing mothers, and of infants and children under school age; home visitings by trained health visitors; the provision of midwifery and of nursing and medical assistance at childbirth (where necessary); the establishment of clinics (ante-natal, natal, and post-natal), etc.

Voluntary effort is encouraged by the Board, but the co-operation between a local authority, which is carrying out a scheme, and the voluntary agencies working in its district must be as close as possible, if the full value of the voluntary effort is to be obtained. The work must be properly co-ordinated, the local authority assigning to each voluntary agency a definite sphere of activity. The Notification of Births Act, 1907 (adoptive) and the Notification of Births Act Extension Act, 1915 (compulsory) are of the greatest value in connection with all maternity and child-welfare schemes : they are the basis of all such schemes. Where a scheme is inaugurated, health visitors must be appointed—the standard of one health visitor to every 500 births notified (a standard which has been suggested by the Board) being an *ideal*. Taking the average numbers of births for England and Wales during the past three years, 2,000 health visitors would be necessary if the Board's *ideal* is to be attained. It is estimated that the total staff of whole-time officers working in connection with maternity and child welfare is 1,100 to 1,200 (averaging the work of part-time officers on a whole-time basis). These figures, though rough estimates only, will give an idea of the *boom* that is at present taking place in the appointments of health visitors and health workers, official and voluntary. Health visitors began to be appointed between 1890 and 1900, and the first infants' consultation was opened in 1906. The qualifications of health visitors are laid down by the Board in the case of the Metropolis, and outside the Metropolis there is a general levelling-up by indirect pressure brought to bear by the Board in connection with the giving of financial grants to local authorities and voluntary agencies. The report consists of 239 pages, and sets out fully what is actually being

done by health authorities and voluntary agencies throughout England and Wales at the time of the date of the report, viz., April, 1917. It is a valuable and noteworthy record, which should be found in the library of every Public Health Department, as showing the way in which this particular work of maternity and child welfare is extending under the care and guidance of the Local Government Board, whose energies will be increased under the new Maternity and Child Welfare Bill, which has been already issued and which will shortly, it is expected, become an Act.

DRINKING WATER IN FACTORIES AND WORKSHOPS.

On December 1st, 1917, an Order, which was issued by the Home Office under the signature of the Home Secretary on October 9th, 1917, came into force. The Order was made under powers conferred under section 7 (1) of the Police, Factories, &c. (Miscellaneous Provisions) Act, 1916, and makes compulsory in all factories and workshops (in which 25 or more persons are employed) the supply of wholesome drinking water at points conveniently accessible at all times to all persons employed therein. The water must be supplied from a public main or from some other source of supply approved in writing by the local authority of the district; and at least one suitable cup or drinking vessel must be provided at each point of supply, with facilities for rinsing it in drinking water. A somewhat novel exception is introduced, dispensing with the cup or drinking vessel in those cases where the water is delivered in an upward jet from which the workers can conveniently drink. The water through the jet may be (*a*) continuous, *i.e.*, in the form of a fountain, or (*b*) intermittent, *i.e.*, operated by the consumers themselves by means of a tap. The continuous fountain method is the better, and the water should be discharged at an angle and from a nozzle that is protected in such a way as to prevent consumers putting their mouths to the actual opening. The idea is American, and is a great improvement, sanitarily, over the old cup or drinking-vessel arrangement. The water must be laid on or contained in a suitable vessel.

MINISTRY OF HEALTH.

All public health officials are on the *qui vive* for the promised introduction by the Government of the Ministry of Health Bill, which, if rumour is true, will prove to be a sort of co-ordinating, consolidating, or amalgamating measure, putting under one Government Department—either an existing Department or one to be newly-constituted—all matters relating to the " public health " in its widest sense. At present, several Departments are concerned—the Local Government Board, the Board of Agriculture and Fisheries, the Board of Education, the National Insurance Commissioners, the Home Office, etc. These various Departments have had entrusted to them at different times public health matters, with the result that responsibility is divided, and a wasteful and inefficient system has resulted in consequence. The same applies to local authorities. There are many

different mutually independent executive or administrative bodies working in the sphere of public health. Unification of control is much needed, both centrally and locally, for the maintenance of the people's health (including the provision of treatment). What is required is a duly constituted and efficient central department, to which all matters affecting public health should be specially referred, thereby co-ordinating, consolidating, and amalgamating the various functions at present carried out by various Government and other Departments.

Public health work embraces *all* measures, whether of prevention or treatment, which will diminish or curtail the duration of disease or which will raise the standard of health of each member of the community. Prevention and treatment must go hand in hand as part and parcel of the same administrative whole, necessitating the appointments of both clinical and administrative (executive) officers, the former being members of the staffs of the latter, so as to avoid all danger of *dual* control, which is wrong in principle. It remains to be seen whether the Government has decided upon an entirely new Department of State or upon a re-organized Local Government Board as the Ministry of Health. In any case, the introduction of the Bill and its conversion into an Act will make the present year, 1918, memorable in the annals of domestic legislation.

HEALTH OF MUNITION WORKERS.

The Final Report of the Health of Munition Workers' Committee has just been published, and it would be difficult to find a more interesting and important Blue Book. The Committee was appointed in September, 1915, " to consider and advise on questions of industrial fatigue, hours of labour, and other matters affecting the personal health and physical efficiency of workers in munition factories and workshops." The Report consists of 182 pages, divided into 20 sections, dealing with introductory remarks, preliminary and historical survey, relation of fatigue and ill-health to industrial efficiency, the industrial employment of women, hours of labour, shifts and breaks and spells and pauses and holidays, Sunday labour and night work, lost time and incentive, food and canteens, sickness and ill-health, injuries and accidents, eye injuries, special industrial diseases, cleanliness and ventilation and heating and lighting, sanitary accommodation and washing facilities and cloakrooms, seats and weights and clothing and drinking water, welfare supervision for women and girls, welfare supervision for boys and men, welfare outside the factory and summary of conclusions.

There are 11 appendices, and an index, in addition.

The summary of conclusions can alone be dealt with in this article, and the *précis* must be brief. Further care and attention are still essential if a serious breakdown of industry is to be avoided, and there is still much need for further improvement in the environment and conditions of employment of the workers. There are two broad principles laid down as the outcome of the Committee's expe-

rience and deductions from the facts brought before them, and these are stated at the commencement of the summary, before the conclusions are tabulated *seriatim* (I.) to (XCVII.), which may be condensed as follows :—

> Without health there is no energy ; without energy there is no output ; and the subject of industrial efficiency in relation to health and fatigue is in large degree one of preventive medicine, a question of physiology and psychology, of sociology and industrial hygiene. There is an intimate inter-relationship between hours of labour and working efficiency as proved by exact scientific experiments, and the result is a tendency to reduce, substantially, hours of labour with a subsequent and resultant increase of output, both for male and female workers, aided by the introduction of systematic shifts, breaks, spells, pauses, and holidays.　Sunday labour is unpopular, uneconomical, and not productive of increased output, and, *cæteris paribus*, the same may be said of night work.　The causes of lost time should be ascertained and the various incentives to work considered.

The value of food and canteens and of welfare arrangements for men, women, boys, and girls, are set out, as is also the need for cleanliness, ventilation, heating, and lighting, sanitary and washing accommodation, etc.　Recreation is an essential aid to recovery from fatigue.

RECENT WORK ON DISEASES OF THE LUNGS.

By A. J. JEX-BLAKE, M.D., F.R.C.P.

Senior Assistant Physician to St. George's Hospital; Assistant Physician to the Hospital for Consumption, Brompton.

TUBERCULOSIS.

In a booklet on *Modern Methods in the Diagnosis and Treatment of Phthisis, with Special Reference to Tuberculin* (London, 1918), J. T. MACMANUS concludes that the various tuberculins, which he does not differentiate clinically, are valuable in the treatment of pulmonary tuberculosis, when used in combination with other methods of treatment. He particularly favours Koch's old tuberculin so far as diagnosis goes; it is an invaluable and indispensable agent in doubtful early cases of the disease. He reviews the whole question of the diagnosis here, and thinks it should be made whenever an unexplained hæmoptysis or pleurisy occurs, and whenever the X-ray picture of the lungs shows heavy root shadows with distinct mottling in the neighbouring lung tissue. An undoubted focal reaction after tuberculin injection is pathognomonic, and a well marked general reaction or cutaneous hypersensitiveness should warrant a diagnosis of phthisis.

H. J. CORPER (*Journ. Amer. Med. Assoc.*, Chicago, 1918, LXX , 1281) describes experiments made to test the virulence of tubercle bacilli grown from human sputum by Petroff's method. Eighty-two specimens of sputum were examined, and in eighty of these the subcutaneous injection of one millionth of a milligram or less of the moist tubercle bacilli sufficed to produce systemic tuberculosis within two months in guinea-pigs weighing about a pound apiece. In one of the two negative cases the tubercle bacilli were not virulent, a dose of one milligram producing only a local tubercle. Sixty-two of the eighty virulent cultures produced systemic tuberculosis within two months when the dose was only one hundred millionth of a milligram. The 82 cultures were isolated from the sputum of 57 far advanced, 18 moderately advanced, and 7 incipient cases of pulmonary tuberculosis; 80 of the strains of tubercle bacilli were of the human variety, one was intermediate, and one was of the bovine variety. As far as could be seen, there was no connection between the severity of the disease in man and the virulence of the organism for the guinea-pig. The author argues that the tubercle bacilli expectorated in open tuberculosis are a danger to the community at large. He agrees with Webb and Gilbert (1914) in the estimate that a culture of tubercle bacilli, sufficiently virulent to infect a guinea-pig when the dose is ten bacilli, is also capable of infecting a child in practically the same dose, that is to say, less than one millionth of a milligram.

Major A. M. CACCINI (*Med. Record, New York*, 1918, XCIII., 529,

describes the way in which all forms of tuberculosis are diagnosed in the Italian soldier and given the necessary treatment; it is assumed that recruits must be taken as free from tuberculosis on enlistment by the mere fact that they have been accepted at that time; and that all cases of tuberculosis discovered among the enlisted men must be considered as having been caused by the war. As a result, the Italian medico-military authorities set up " diagnostic centres " for the rapid and correct identification of tuberculous lesions, and " sanatorial centres " for the cases of initial tuberculosis whose discharge from the army had been left undecided.

Definite cases are at once discharged from the army, and put in the hands of the proper local civilian authorities to be followed up. The diagnostic centres have a specially qualified medical staff; that at Rome is described in detail, and is said to have a mean daily movement of 20 patients. Tuberculin is not used at all as a means of diagnosis; the average time taken in establishing the diagnosis is ten days, and the chief means employed are sputum examinations, X-ray examinations, laryngoscopy, and the usual physical examination. For military purposes, the physical signs and symptoms of pulmonary tuberculosis have been put into two categories, namely, (1) the criteria of certainty; and (2) the criteria of presumption.

The (1) criteria of certainty admit four forms, namely :— (a) examination of sputum positive; (b) examination of larynx positive; (c) examination of sputum negative, stethoscopical examination negative, X-ray examination positive (broncho-pneumonia or pleurisy); (d) examination of sputum negative, X-ray and stethoscopical examinations positive.

The (2) criteria of presumption for a definite diagnosis of active pulmonary tuberculosis, when further investigation and treatment are indicated, may be expressed in three formulæ :—

I. Examination of the sputum negative; Stethoscopical examination negative ; X-ray examination positive ; General symptoms positive.

II. Examination of the sputum negative; Stethoscopical examination positive; X-ray examination positive; General symptoms negative.

III. Examination of the sputum negative; Stethoscopical examination negative; X-ray examination positive; General symptoms negative.

Here evidences of adenitis and peribronchitis are included in the positive X-ray examination. Soldiers exhibiting the criteria of presumption are given from four to twelve months' leave, then returning for further examination to the diagnostic centre that originally pronounced judgement on their cases. Soldiers exhibiting minimum forms of the criteria of presumption are detailed to sedentary service. Plans are now being made for the further treatment by the military authorities of tuberculous patients discharged from the army. Experience is said to show that the disease must generally be regarded as the awakening of an old or a latent infection in these soldiers, and

not as a new infection.

M. FISHBERG (*Journ. Amer. Med. Assoc.*, Chicago, 1917, LXVIII., 1791) gives a general discussion on " Tuberculosis and War " with many references to the recent European literature of the subject. He quotes various writers to the effect that many men with quiescent or latent phthisis do as well at the front as in civil life; it is generally agreed that active tuberculosis of the lungs should not be sent out. Clinically cured tuberculous subjects, who stand the period of training well, may be sent to the front without hesitation; many cases are quoted in which camp life seems to have given the finishing touch to a treatment started in a sanatorium or at home. The war has not increased either the morbidity or the mortality of tuberculosis, but rather the reverse; no doubt because the general conditions of life (apart from shot and shell of every kind) are healthier at the front than in civilian life. And so far as civilian life is concerned, there seems no reason to suppose that the war has increased the incidence of tuberculosis, at any rate in France.

T. J. BEASLEY (*New York Med. Journ.*, 1917, CVI., 116) describes the benefits to be obtained in pulmonary tuberculosis by the intravenous injection of calcium salts, based on three years' work and the treatment of 120 patients. He uses calcium chloride in sterile neutral solution; the dose varies from one to six grains, and is proportioned to the patient's weight and regulated by observations on the coagulability of the blood. The interval between the injections is not stated; the treatment goes on for six months to a year. It is said to be a real aid in the treatment of phthisis, and to have a decided tonic effect, making the patients feel better, cough less, eat more, and grow stronger.

G. H. EVANS (*Med. Record*, New York, 1917, XCII., 575) describes the results he has obtained in the treatment of ten phthisical patients by the intravenous injection of Koga's double salt, copper potassium cyanide. The injections are given every fortnight into a vein at the bend of the elbow; a 0·2 per cent. solution is used, and from 8 to 21 milligrams of the double salt are injected. He concludes that the treatment is not harmful, though local soreness may result if any of the injection goes astray, and occasionally a rigor may follow its administration. A focal reaction usually follows the exhibition of the larger doses, and coughing may be increased and may demand the use of sedatives. Often, too, pleural pain followed the injections. The author sums up by saying that the value of this double salt in the treatment of pulmonary tuberculosis has not been conclusively demonstrated, but that its further trial is justifiable.

N. B. BURNS and A. E. YOUNG (*Amer. Journ. Med. Sci.*, Philadelphia, 1917, CLIV., 797) have made extensive experiments upon the coagulation time of the blood in patients with pulmonary tuberculosis. They describe the apparatus they use, which is based on Cannon's coagulometer, and depends on the impediment afforded to the movement of a wire by the coagulation of blood in a glass cannula. In particular they have endeavoured to determine whether phthisis

K

with hæmoptysis is associated with a prolonged coagulation time. One hundred and forty-eight blood specimens from 120 different patients were examined. The average coagulation time in 130 trials was $7\frac{3}{4}$ minutes; two patients with open semi-active pulmonary lesions yielded specimens that did not coagulate within 28 and 34 minutes respectively; each had had recent hæmoptysis, and four months later, after some improvement and no return of hæmoptysis, one of these men presented a coagulation time of six minutes. The blood of one patient coagulated in less than three minutes. Taking 12 patients with recent hæmoptysis the average coagulation time was $8\frac{1}{2}$ minutes; with 12 parallel patients without hæmoptysis the average coagulation time was also $8\frac{1}{2}$ minutes. The authors conclude that no particular results can be deduced from their work, whether the patients were grouped in accordance with (a) the coagulation time, (b) the occurrence or non-occurrence of hæmoptysis, or (c) the stage of the disease, or its activity or quiescence. No attempt was made to show the results of medication with calcium salts; it is said that Addis (1909) found that the coagulation time of the blood was unaffected by the oral exhibition of soluble calcium salts, and that while the amount of ionizable calcium in the blood is increased by this exhibition, the increase is considerably less than that necessary to exert an appreciable effect on the coagulation time.

THE TREATMENT OF PNEUMONIA.

S. Solis-Cohen (*New York Med. Journal*, 1918, CVII., 1057) notes that in Type I. pneumonia there is a strictly specific anti-serum, produced by Cole at the Rockefeller Institute, that gives excellent results (95–97 per cent. of recoveries); there are no efficacious anti-serums for the other types of pneumococcus. The vaccine treatment has often been tried, and in general may be said to do no harm to the patient. In certain hands, however, definitely good results have been obtained by the use of routine compound vaccines containing, *e.g.*, three types of pneumococci with streptococci, M. catarrhalis, and mixed staphylococci, given in doses increasing from 125 to 500 million every 72 hours. The author concludes that optoquin (or ethylhydrocuprein) is not a good drug in pneumonia, and is inferior to quinine given in large doses; he has used the latter systematically for many years. The salt he prefers to employ is quinine and urea hydrochloride; the initial dose by the mouth for a young robust adult should be 25 grains or more, or 15 grains intramuscularly. The drug is repeated, in accordance with the clinical indications, every four hours until the temperature falls some two or three degrees, the dose being 10 to 25 grains as a routine, or less if the patient is improving. Pneumonia patients, he says, show a marked tolerance for quinine, even if in health they are very intolerant of it. Sometimes three or four doses only are required, in other cases 10 or 15. For tympanites in pneumonia pituitrin, or pituitrin alternating with eserin, is injected intramuscularly and repeated every hour. Digitalis may be administered with the quinine as described above; and the

patients are encouraged to drink plenty of alkaline saline beverage to keep the urinary excretion up to four or five pints daily.

A. BLOOMFIELD (*Bull. Johns Hopkins Hosp.*, Baltimore, XXVIII., 301) describes the use of Rockefeller Hospital, Type I., anti-pneumococcus serum in 11 cases of Type I. lobar pneumonia. The pneumococcus was usually isolated from the sputum by mouse inoculation, and the type determined by agglutination with stock immune serums. The antiserum was warmed and injected intravenously by gravity at the rate of 2–4 c.cm. a minute, after a preliminary desensitizing dose of 1–5 c.cm. had been given subcutaneously or intravenously. Blood cultures were made before and after treatments, and samples of blood were drawn for agglutination tests Seven of the patients were coloured labourers. In six cases the blood was sterile; in five it contained pneumococci, and in four it promptly became sterile after the treatment was begun—100 c.cm. of the serum being injected as a rule once a day. There was no striking change in the clinical course of the cases which could clearly be attributed to the serum, and no constant change in the agglutinating power of the patients' blood. In two cases acute anaphylactic shock followed immediately after the initial serum injection; in five there were very severe late reactions—long periods of high fever and prostration punctuated by various symptoms of serum disease. The author concludes that his results throw little light on the curative value of the serum. Most of the patients were treated after the fifth day, so that abortive terminations of the disease, suggestive of effective therapy, could not be obtained. Two of the three fatal cases were practically moribund when the serum was given. In only one instance did the pneumonic lesion spread after the serum had been administered.

L. D. BRISTOL (*Boston Med. and Surg. Journal*, 1918, CLXXVIII., 437) argues that measles may be nothing more than the manifestation of an anaphylactic intoxication following sensitization with a well-known microbe, namely, the pneumococcus. Taking buccal swabs from 24 sporadic cases of measles in Boston he obtained the pneumococcus in all, and in pure culture in 15. He suggests that measles epidemics might be checked by the prophylactic use of pneumococcus vaccines, just as the spread of scarlet fever (which may be regarded as the result of a streptococcal anaphylaxis) may be checked by the prophylactic use of streptococcal vaccines.

HAY FEVER AND ASTHMA.

W. SCHEPPEGRELL (*New York Med. Journal*, 1918, CVII., 1016 describes the pollen treatment of hay fever. In America the principal hay-fever pollens fall into four groups, namely, (1) Ambrosiaceæ (ragweeds); (2) Gramineæ (grasses); (3) Artemisia (wormwood); (4) Chenopodiaceæ (amaranths, chenopods, docks, Russian thistles). In certain localities other hay-fever producing pollens occur, such as those of the mountain cedar and the Western cottonwood. When a hay fever patient first comes up for treatment, certain diagnostic tests, based on the general botanical distribution of the hay-fever

plants in the locality where he lives, are carried out by the intracutaneous injection of small amounts of weak pollen suspensions into the skin of the forearm. A positive reaction is shown by the appearance of an urticarial wheal surrounded by a zone of hyperæmia in 15 minutes. In most cases two tests, say with the grass and ragweed pollens, are made at the same time. Prophylactic treatment for hay fever should begin four to six weeks before the usual time of onset of the disease, with injections thrice weekly; the dose increasing from five up to fifty units (one unit equals o·oo1 milligram of pollen protein). During the active stage of hay fever, which is generally due to grass pollens from April to July and to ragweed pollens in August, September, and October, the pollen treatment is usually combined with a " catarrhal " stock vaccine containing per c.cm. 350 million B. Friedländer, 450 million M. catarrhalis, 30 million pneumococcus, 35 million streptococcus, 50 million staphylococcus aureus, and 40 million S. albus, all killed. The initial dose is half a c.cm , followed one to three days later by a full dose of one c.cm. The author finds that many patients who suffer from asthma in the pollen season gain much benefit from the hay-fever treatment. Analysing the results in 285 cases treated with pollen or pollen plus vaccine in 1917 he claims seasonal cure in 45 per cent. and definite improvement in 42 per cent.

J. M. HUTCHESON and S. W. BUDD (*Amer. Journ. Med. Sci.*, Philadelphia, 1918, CLV., 826) describe asthma as a manifestation of protein sensitization, and its paroxysmal outbursts as anaphylactic shock. The specific poison may occur either in many forms or is common to a great variety of plants, bacteria, and animals. They have treated 20 patients with autogenous vaccines prepared by incubating one c.cm. of the patient's washed sputum with 10 c.cm. of broth and one or two drops of guinea-pig serum for 48 hours; at the end of that time the culture is standardized (500–1,000 million microbes per c.cm.), killed by heating to 60° C. for two hours, and preserved by adding carbolic acid to 1 per cent. The initial dose of 5 minims is increased by 1 minim in subsequent doses up to 15 minims; the injections are made twice a week. Twelve of the patients were cured after from one to five injections, five others were distinctly improved.

SPONTANEOUS PNEUMOTHORAX.

P. H. PIERSON (*Boston Med. and Surg. Journal*, 1918, CLXXVIII., 385) states that less than a hundred cases of spontaneous pneumothorax have been reported in patients with no demonstrable pulmonary disease, and describes its occurrence in a new-born child, produced, apparently, by the initial cry. The child was cyanotic at birth, with diminished breath sounds on the right side. Next day it was ashen grey in colour, but not marked by dyspnœic. After this it improved, and was apparently well again on the fourteenth day. The case is illustrated by three characteristic skiagrams.

THE TUBERCULOSIS PROBLEM.

By E. WARD, M.D., F.R.C.S.

Tuberculosis Officer, S. Devon.

We have now to face an increase in tuberculosis from war causes, and the time has come seriously to consider how our methods of dealing with it may be improved.

Sanatorium treatment, from which so much was expected, has not obviously reduced the death-rate from tuberculosis, and it seems highly probable that the same will have to be said of the dispensary system, as at present carried out. Without discarding the whole of our present system, certain radical changes are called for before we can expect success :—

1. The problem should be attacked first and mainly from the preventive side, the authorities endeavouring to lessen the disease as a whole, instead of concentrating attention on the welfare of each individual patient.

2. A serious attempt should be made to improve the present sanatorium results by modifying some of the lines of sanatorium treatment.

3. Changes in the central tuberculosis administration should be made.

4. Energetic search should be made for fresh methods of treating the disease.

1. The chief error now made is that attention is focussed on the curative side of treatment, and not on the preventive side, which is considered too difficult to be tackled with advantage except indirectly.

The fear of doing harm to the tuberculous by calling them infectious must be considered, but it is the infectious side of the disease which chiefly impresses the tuberculosis officer, and it is from the point of view of infection that the disease may be attacked most profitably. Half the cases notified are infective, and although infection is not transferred so rapidly as in, for instance, measles or scarlet fever, and the general resistance to it is higher, yet the patient may remain infective for an indefinite time. If the disease is to be dealt with effectively, therefore, it must be on the same general lines as other infectious diseases—by the complete or *partial* isolation of infective cases and the examination of contacts.

Faced with a widespread and very dangerous infectious disease, the best initial step to meet it would doubtless be universal vaccination against it as for small-pox, but unfortunately this is not yet possible,

and even though vaccination against small-pox is general, cases are still isolated; while neither isolation nor vaccination is practised in tuberculosis.

A very great deal can be done without compulsory segregation if the accommodation is available, but compulsory segregation for infective cases is bound to come sooner or later. It is probable that the public as a whole is already ripe for it, as well as a large and increasing minority of the medical profession. Moreover, if compulsory isolation loomed in the background, it would have to be used only very rarely, if at all. As to concealment of cases, an advanced, highly infective case, the sort that needs isolation, cannot well be concealed.

It is known there was a steady diminution in our tuberculosis mortality from about 1860 down to the last few war years. The rate of diminution was slowing, yet still the death-rate continued to diminish. It seems likely that this was brought about by the isolation of very highly infective cases in poor law infirmaries and elsewhere, whither they were taken for poor law reasons rather than for the purpose of isolation.

Certain indirect methods of attack, such as by better housing accommodation, are important in their way, for they may increase the resistance of the community and make partial isolation easier to attain, but they should not be allowed to obscure the main issue. It has been overlooked that the housing problem is to a considerable extent the problem of *infected houses*. There are few houses, however large or well situated, that have not a case of infective tuberculosis within their walls every 5 or 10 years, and if we consider cottages and slum dwellings, many of these are rarely without an infective tuberculous inmate. The better classes, again, do not often change their house, but the poor do so frequently, especially the tuberculous poor. I know of cases in which a tuberculous family has moved four times in one year. It is exceedingly difficult to follow up and disinfect after these removals, at present it is scarcely attempted; and it can readily be seen how infection is thus spread among dwellers in poor houses, most of all among the poorest of them, where it is most likely to linger owing to lack of light and ventilation. To erect new houses for the slum-dwellers without at the same time isolating infective cases of tuberculosis, would lead sooner or later to a repetition of the present circumstances.

Under the dispensary system as administered in most places, the tuberculosis officer makes his headquarters a tuberculosis dispensary which serves as a " sorting house." He sees and treats such patients, and examines such contacts as are willing to go there, and gives opinions about others that may be sent for that purpose by doctors in the neighbourhood. His time is devoted to diagnosis and curative treatment. The *preventive* treatment is carried out by medical officers of health, sanitary inspectors, nurses and health visitors, who visit the homes of notified cases, investigate home conditions and give advice in a more or less conventional way. In a large number of cases, *where the chief source of infection is the patient notified*, this arrangement is satisfactory

to some extent, even although there may be other cases in the house requiring treatment who will not go to a dispensary to be examined, and who are therefore missed. But it often happens that a child has been notified, or a young adult, when the chief source of infection is one of the parents, grandparents, a relative staying in the house, or a lodger, and in such a case the health visitor, *who is bound to presume that the case notified is the one requiring the visit*, does very little good. In certain instances, rare, it is true, the medical officer of health, or health visitor, does more harm than good by the present methods. For example, a notified tuberculous father may be given a room to himself, while his wife, who has chronic tuberculosis *and is the source of his infection*, is sent to sleep with, and infect, the children. Or a child with enlarged glands is removed from the company of other children, some of whom have glands equally large (but unnotified), and sent to sleep with a tuberculous grandmother.

I may mention also the case of two children, with wealthy parents, living in a large country house. Both children had tuberculous glands of the neck; they had been sent away in the care of their nurse, and the cows of the vicinity had been persecuted, but without result. The source of infection was the nurse, who had physical signs of phthisis on both sides, and who had suffered from cough, sputum, and occasional hæmoptysis for some years. " Nanny " was regarded as a sort of family institution, and this source of infection, common among the children of the well-to-do, had been entirely overlooked.

According to figures collected for the purpose I find that in about 35 per cent. of notified cases the customary " health visit " does little or no good, while in 2 per cent. it is, or may be, harmful.

In order to combat tuberculosis effectively the tuberculosis officer *must visit personally the home of every notified case* (where this can be done without detriment to the practitioner or patient—about 94 per cent.) *there to investigate the home conditions and examine contacts.* No doubt this entails much trouble and needs tact and diplomacy, but anything *short of it will be useless ;* no amount of assiduous outpatient work can replace it.

This modification of methods can be arranged without upsetting the main lines of the present scheme. In order to free the tuberculosis officer for preventive work, the outpatient dispensary could well be carried on by practitioners in the neighbourhood, paid as part time assistant tuberculosis officers. I believe an experienced practitioner would often be more successful in the outpatient treatment of tuberculosis than a whole time tuberculosis officer. After all, the treatment required' is almost entirely symptomatic, and mainly for cough or dyspepsia—two symptoms of which a practitioner has more experience than of any others. The appointment might well be an annual one, in order to interest as many men as possible in the work. It could easily be arranged also that tuberculin, and other of the more experimental remedies, should only be used in consultation with the tuberculosis officer.

A further important step for the prevention of tuberculosis would be

the provision of more isolation hospital accommodation; we probably have already sufficient sanatoria, if properly used and pooled. The hospitals would be used also for observation purposes, but some of the beds *tacitly* reserved for isolation. Some of the present V.A.D. hospitals might readily be adapted to this purpose later on. The number of highly infective cases requiring isolation is not very large; I estimate that in South Devon 60 beds, 30 for each sex, would suffice for the purpose. Most of us can deal with a small dose of tubercle bacilli, but few can resist a large dose.

2. On the *curative side of* treatment it should be possible to get better results, bearing in mind that in the absence of any specific remedy, the best we can do at present is to raise a patient's resistance to the highest possible level and there maintain it until the disease is arrested and all danger of auto-reinfection has passed (with bacilli present in the sputum this dangerous auto-reinfection period may continue for many years).

Concerning sanatorium treatment, I believe that less exposure and more care to prevent chilling patients would widen the scope of these institutions and give better results. Pasteur was able to infect hens with anthrax only after chilling them. At Davos I have been told : " You English doctors treat your sanatorium patients as you would not treat your dogs," meaning that they are too much exposed to all kinds of weather. Possibly it is this common sense application of fresh air, rather than the value of climate, which gives Davos better results than those obtained by sanatoria in healthy places elsewhere.

It has been stated authoritatively, and is therefore generally believed, that cold is the most valuable part of sanatorium treatment, more valuable indeed than the air. " The blood is driven from the skin to the internal organs," it is said, and so forces are concentrated to fight the disease. It is also a matter of tradition in this country, that very little heed need be paid to exposure to cold winds and damp; and patients are said to do better under sanatorium treatment during the winter months. I am sure that this is a mistake, and that the future will show how wrong it is. No doubt every sanatorium can show cases which stand the cold successfully, and may even be the better for the exposure; but it is a question of individual constitution and these patients are a minority. It is a case of survival of the fittest. We see the few who have benefited, or at least not suffered, from cold and exposure; the majority who refuse to submit to it, or have failed to stand it, we do not see. Attention to this point might improve considerably our sanatorium results.

Possibly it is to repose, *mental* and physical, that the sanatorium system owes what success it has. Fine scenery and country surroundings induce mental repose in the wearied town-dweller, while freedom from family affairs and squalid, cottage conditions do the same for the countryman.

3. The control of our fight against tuberculosis is in the hands of certain officials of the Local Government Board. Now it is highly necessary that some co-ordinating power should exist and attend to

the innumerable details of the scheme, but some body not wholly composed of officials should direct the main lines of attack.

Officialdom at its best tends to crystallize and preserve the prevailing authority and tradition. This may be very advantageous when authority and tradition are pointing the right path to follow, *but in tuberculosis the results show it is not so.* In spite of all our officials we are not yet fighting the disease with any genuine sign of success.

The most promising form of directing authority would be a triennially appointed committee of five, composed let us suggest, as follows :—

(1) An *official* from the Local Government Board.
(2) A *tuberculosis* officer. These might both be nominated by the Local Government Board to begin with.
(3) A *general practitioner*, nominated, say, by the British Medical Association.
(4) A *physician* nominated by the Royal College of Physicians.
(5) A *surgeon* nominated by the Royal College of Surgeons.

4. In tuberculosis there is almost more field for research than can be found elsewhere in medicine, and the research grants of the National Insurance Act give an opportunity for carrying it out which has not hitherto existed. Tuberculosis is the greatest scourge of mankind, and yet no satisfactory remedy has yet been discovered. Possibly the attack from the surgical side (by pneumothorax and allied measures) is the only real advance in recent years; but although these methods may be of genuine value in certain cases, their scope is very limited, and the suggestion to extend them to early cases—the advocate of every form of treatment asks for early cases, many of whom get well if only left alone—may well bring them into undeserved disrepute.

EXERCISE, WORK, REST, AND SLEEP: COMPARISON OF
SAYINGS IN REGARD TO THEIR HYGIENIC
AND PSYCHICAL VALUE, ETC.

By F. PARKES WEBER, M.A., M.D., F.R.C.P.

The habit of early rising has had innumerable advocates in the literary
world. *Sanat, sanctificat et ditat, surgere mane* (Early rising makes
healthy, holy, and wealthy) is a maxim quoted in *A Health to the
Gentle Profession of Serving-Men* (1598), and is similar to the best
known proverbial saying of the kind, by Benjamin Franklin, in *Poor
Richard*, for 1735 :—

> " Early to bed and early to rise,
> Makes a man healthy, wealthy, and wise."

Henry Vaughan, " The Silurist " (1622–1695), a medical practi-
tioner as well as mystic poet, believed that early rising had a great
effect on the human mind :—

> " Rise to prevent the sun ; sleep doth sin glut,
> And heaven's gate opens when the world's is shut."

Sancho Panza, in *Don Quixote*, thought that the teaching of pro-
verbial philosophy was, in this respect, wrong. He maintained
that " Heaven's help is better than early rising "—regardless of the
ancient Æsopian fable of the carter, whose cart had stuck in the muddy
rut and who prayed to Hercules, instead of putting his shoulder to the
wheel. The early riser, who gets up " to catch the worm " (or sometimes,
as Dr. G. Pernet suggests, to take his matutinal *petit verre pour tuer le
ver*), has been cleverly made fun of by the American poet J. G. Saxe
(1816–1887), in his humorous poem on " Early Rising " (R. L. Paget's
Poetry of American Wit and Humour, 1899, p. 110) :—

> " ' God bless the man who first invented sleep ! '
>   So Sancho Panza* said, and so say I :
> And bless him, also, that he didn't keep
>   His great discovery to himself; nor try . . .

> " ' Rise with the lark, and with the lark to bed,'
>   Observes some solemn, sentimental owl ;
> Maxims like these are very cheaply said ;
>   But, ere you make yourself a fool or fowl,
> Pray just enquire about his rise and fall,
> And whether larks have any beds at all !

* In regard to this saying of Cervantes, in *Don Quixote*, *cf.* Sterne, in
Tristram Shandy :—" ' God's blessing,' said Sancho Panza, ' be upon the
man who first invented this self-same thing called sleep; it covers a man
all over like a cloak.' "

> " So let us sleep, and give the Maker praise.
>   I like the lad who, when his father thought
>   To clip his morning nap by hackneyed phrase
>   Of vagrant worm by early songster caught.
>   Cried, ' Served him right !—it's not at all surprising;
>   The worm was punished, sir, for early rising ! ' "

Very much importance is not generally attached to the saying of a royal early riser (King George III. of England), that " six hours' sleep is enough for a man, seven for a woman, eight for a fool " (*Famous Sayings and their Authors*, by Edward Latham, 2nd edition); but we have also the proverbial *Sex horas somno,** quoted by Sir Edward Coke (1552–1634), and the English variant suggested by Sir William Jones (1746–1794) :—

> " Seven hours to law, to soothing slumber seven,
>   Ten to the world allot, and all to Heaven."

Moreover, Victor Hugo inscribed on a wall of Hauteville House (his residence in St. Peter Port, Guernsey) the following advice to those wishing to become centenarians, in the words of an old French proverb :—

> " Lever à six, dîner à dix,
>   Souper à six, coucher à dix,
>   Fait vivre l'homme dix fois dix."

Of all the beautiful sayings in praise of sleep I would here instance two. One is a remarkable little poem by " L. S.," founded on the old Latin saying, *Vixi et amavi* (" I have lived and loved "), as summing up a man's whole life when he dies. After enumerating the vicissitudes, successes and failures, so-called " gains " and " losses " of an active life, the poem ends as follows :—

> " And all these things—but two things—
>   Were emptiness and pain ;
>   And Love—it was the best of them ;
>   And Sleep—worth all the rest of them."

The other is a Latin poem by the English poet-laureate, Thomas Warton the younger (1728–1770), written to be placed under a statue of Sleep (the " living likeness of Death "—*Somnus, mortis imago*) :—

> " Somne veni, et quamquam certissima mortis imago es
>   Consortem cupio te tamen esse tori :
>   Huc ades, haud abiture cito : nam sic sine vitâ
>   Vivere quam suave est, sic sine morte mori ! "

Of Warton's lines there is an English version by Dr. John Wolcot

---

* Contrast an old Greek epigram (*Anthol. Græc. Palat.*, x. 43) : " Six hours for labour; the four following hours tell men to *live*." The Greek word for *live* was ΖΗΘΙ, and the four letters which formed the word were likewise used as the numerals 7, 8, 9, and 10.

(1738–1819), physician, priest, poet, and satirist—" Peter Pindar,"* according to the name under which his well-known satirical writings appeared :—

> " Come, gentle sleep ! attend thy votary's prayer,
>   And, though death's image, to my couch repair;
>   How sweet, though lifeless, yet with life to lie
>   And, without dying, O how sweet to die."

Dying during sleep is in a kind of way really " dying without death " (Warton's *sine morte mori*), and Dr. William Munk, in his *Euthanasia* (London, 1887, pp. 40, 41) thus refers to passing away during sleep :—" It is probable that here a mere act of dozing becomes the act of dying. In these instances, as in old age, death is literally the last sleep, uncharacterised by any peculiarity. The general languor of the functions in the last waking interval is attended with no peculiar suffering, and the last sleep commences with the usual grateful feelings of repose."

For the genuine *enjoyment* of sleep and rest it is clear that exercise and work are as necessary as the existence of pain and sadness is for pleasure and gladness, life and growth for death and decay, grief for joy, misery for happiness, evil for good, opposition for valour, vice for virtue, pessimistic ideas for optimistic ideas, darkness for light, female sexuality for male sexuality, and negative electricity for positive electricity. Therefore, the coupling of labour and rest in the following verses (of which I do not know the author) is certainly to some extent true to nature :—

> " Labour and rest, these are the best
>   Blessings that Heaven gives;
>   And happy he who makes them be
>   His gladness while he lives."

The most elaborate and enthusiastic encomium in praise of work is perhaps that by Thomas Carlyle, in his *Past and Present*, which appeared in 1843. At that time Carlyle himself was at his zenith in regard to delight in, and capacity for, work. True work acts like a ferment, and Carlyle kindled enthusiasm in those he met. " Shall I not have all eternity to rest in ? " he exclaimed. " There will be sleeping enough in the grave," wrote Benjamin Franklin (*Pennsylvania Almanac*, 1758); " The night cometh when no man can work " (*St. John*, ix. 4). Resting easily leads to rusting, so Luther thought and he is supposed to have said : " Rast' ich, so rost' ich " (If I rest, I rust). There is an old German proverb, " If I rest, I rust, says the key," and a saying attributed to Richard Cumberland, Bishop of Peterborough (1631–1718), is, " It is better to wear out than to rust out." Amongst old sun-dial mottoes are the following:

---

* The front of Peter Pindar's house, in Bishopsgate Street Without, is now to be seen in the Victoria and Albert Museum, London.

Laborare est orare (To work is to worship God) ; *Ora et labora* (Worship
and work) ; *Qui laborat orat* (He who works, worships) ; *Labor ipse
voluptas* (Work is itself pleasure—delight) ; *Labora dum lucet* (Work
while there is light). According to Carlyle (*loc. cit.*) " all true work
is religion," and " admirable is the saying of the old monks, *Laborare
est orare.*" " Oh, brother, if this is not *worship*, then I say the more
pity for worship ; for this is the noblest thing yet discovered under
God's sky." " Nothing is impossible to industry "—was one of the
" wise sayings of the seven wise men of Greece." Bismarck said :
" To youth I have but three words of counsel—Work, work, work."
Goethe, as translated by Carlyle, advised man to " think of living "
(rather than of dying) ; " Work and despair not."

In regard to praise of the more physical and medical advantages
of exercise and work, I would turn to Dryden's famous lines :

> " Better to hunt in fields for health unbought,
> Than fee the doctor for a nauseous draught.
> The wise, for cure, on exercise depend. . . ''

Very interesting also are some verses on Dr. Jephson, of whom
there is a statue in the Spa Gardens of Leamington. These verses
were copied in the *British Medical Journal* in 1897 (and again in 1911,
Vol. 2, p. 459), and refer to Jephson's advice in regard to walking.
One of Jephson's patients, supposed to be answering an inquiry,
begins :—

> " He does, Sir ; so much so, that some have a notion
> The secret is his of perpetual motion ;
> For all the disciples who Jephson obey
> Walk out in all seasons, all hours of the day."

In the following lines (in English, and also in a kind of mediæval
Latin hymnologist style) I have endeavoured to put together some
of the views expressed (perhaps rather extravagantly) by Carlyle, and
by numerous old and modern writers, on the physical and mental
advantages of work and exercise :—

> " Let others rest, if they would rust
> Before they must return to dust.
> It's exercise that I advise,
> And so will you, if you are wise."

> " Ambulare, se curare ;
> Se movere est valere,
> Et valere est gaudere ;
> Laborare est orare ;
>   Nox et quies imminent."

It is really not at all surprising that, on the subjects above referred
to, one should occasionally hear contradictory views expressed, for the
questions which arise in connection with them are often only questions
of mental inclination or expediency, though sometimes of vital import-

ance or duty.

The beneficial mental effects of work—that is to say, active objective work—in life can hardly be overestimated. There can be little doubt, I believe, that (to a certain extent) superfluous sexual force may (by some process of metamorphosis, analogous to transformation of ordinary physical forces, according to the law of conservation of energy) be diverted into other and useful channels, so as to increase the quantity and quality of the physical and mental outputs in other directions. In this respect I must quote some interesting passages from Dr. Constance E. Long's translation of *Papers on Analytical Psychology*, by C. G. Jung of Zürich (London, 1917) :—

> " All psychical phenomena can be considered as manifestations of energy in the same way as all physical phenomena are already understood as energic manifestations. . . . This energy is subjectively and psychologically conceived as desire. I call it *libido*. . . . From a broader standpoint libido can be understood as *vital energy in general*, or as Bergson's *élan vital*. . . . By libido I understand very much what Antiquity meant by the cosmogenic principle of *Eros*—in modern terminology simply *psychic energy*. . . . Libido can perhaps be described as *effect*, or *capacity for effect*. It is capable of transformation from one form to another (*op. cit.*, p. 288, footnote). . . . In the past nothing can be altered and in the present little, but the future is ours and capable of raising life's intensity to its highest pitch. A little space of youth belongs to us; all the rest of life belongs to our children."

In connection with the subject of the benefits derived from active and objective work, it must be admitted that every individual should have aims and objects and ideals in life, and a sphere of possible usefulness; in other words, that he should use a rudder to his boat of life. The mere propelling force without any idea or power of steering is not very satisfactory—hardly more so than is a good steering apparatus without sufficient propelling force.

Some so-called neurotic persons seem to be handicapped by relative absence of spontaneous activity and inclination to work (propelling force), whereas in others purpose and object (ports to steer to) seem to be lacking, and again in others the will-power (steering apparatus, etc.) appears to be deficient. Robert Louis Stevenson made the puppets in his novels of great living, human interest, because he kept them in active movement, often passionate movement, always purposeful movement—whether for good or evil, for right or wrong. He thoroughly realized that there must be a propelling force and active motion of some kind for any purpose to be accomplished, and that the ship of life must be propelled (must have way) if it is to obey the helm. Stevenson's heroes might say with Goethe's spectre, standing on the battlements of a Rhenish castle (*Geistes-Gruss*) : " Half of my life was spent in stormy action; during

the other half I stretched myself out in refreshing rest and sleep "—

> " Mein halbes Leben stürmt' ich fort,
> Verdehnt' die Hälft' in Ruh.''

Sir William Osler, in his beautiful Address to students of Yale University (1913), quotes a grand sentence of Thomas Carlyle : " Our main business is not to see what lies dimly at a distance, but to do what lies clearly at hand." Osler himself counsels a system of what he calls " *daytight* compartments " for the voyage through life. " Shut off the past ! Let the dead past bury its dead." " The load of to-morrow, added to that of yesterday, carried to-day, makes the strongest falter. Shut off the future as tightly as the past." He tells us that on the title page of the *Discours de la Méthode*, by Descartes (1637), is a vignette showing a man digging in a garden with his face towards the earth, on which rays of light are streaming from the heavens; beneath is the motto, *Fac et spera* (Do your work and hope). Surely this device well illustrates the glorification of man's daily work in the words of Carlyle, Walt Whitman, and others. In regard to the idea of dividing life into " *daytight* compartments " one may compare a Greek epigram by Palladas (*Anthol. Græc. Palat.*, X. 79), commencing : " We are born day by day with every morning, retaining nothing of our former life "; and in another epigram (*ibid.*, X. 78) Palladas, whose epigrams are said to have been much admired by the great scholar, Erasmus of Rotterdam, advises mortal man not to waste his short life and torment his soul with useless regrets, etc.

THE SURGICAL TREATMENT OF INTUSSUSCEPTION.

By W. H. C. ROMANIS, M.B., M.C., F.R.C.S.

Surgical Registrar, St. Thomas's Hospital ; Surgeon, King George Hospital,

Of the many varieties of acute intestinal obstruction, none is of greater interest than that form known as intussusception. With the exception of cases of strangulated external hernia, this is the commonest form of acute intestinal obstruction that occurs; that it is by no means uncommon in hospital practice will be seen from the fact that in one London hospital alone 35 cases were operated on in the year 1917. Occurring, as the majority of cases do, in the early years of life, it might well be expected that the diagnosis of the condition would be difficult and cases only recognized in their later stages, were it not for the fact that the symptom of passage of blood in the motions is almost constantly present, and this is a condition which invariably attracts and fixes the attention both of the educated mind of the physician and the anxious mind of the mother.

The following paper is based on the results of 374 cases of intussusception treated by laparotomy at St. Thomas's Hospital during the 20 years from 1898 to 1917 inclusive; these cases include almost every case of intussusception that was admitted to the hospital during that period, the only outstanding ones not included consisting of :—

(a) A few cases moribund on admission the condition of which was too bad for operation to be considered.

(b) An even smaller number in which an intussusception being thought to be present, a laparotomy was performed and nothing abnormal found.

No attempt has been made to distinguish between so-called " acute " and " chronic " cases, for, in many instances, it is difficult to decide which term is the more suitable; but the well-known fact that in elder patients the disease is usually more chronic and less dangerous is borne out on examination of the histories. It is approximately 20 years since laparatomy has become the recognized routine treatment for this condition, and this seems a not unsuitable opportunity to record its results.

I would here like to record my thanks to the medical and surgical staff of St. Thomas's Hospital for their kindness in allowing me to make use of the case notes.

MORTALITY.

Among these 374 cases the total mortality was 121 or 32·3 per cent.; if, however, we take the four quinquennial periods 1898–1902, 1903–1907, 1908–1912, and 1913–1917, inclusive, we find that the

numbers of cases admitted and their mortalities are :—

Period	1898–1902.	1903–1907.	1908–1912.	1913–1917.	Total.
Number of cases	81	66	101	126	374
Mortality	48˙1 per cent.	37˙8 per cent.	32˙4 per cent.	19˙2 per cent.	32˙3 per cent.

These figures show, therefore, a more or less continuous increase in the number of cases operated on, but a steady drop in the mortality from 48·1 per cent. to 19·2 per cent.; the lowest annual mortality of the series recorded in any year being in 1915, when 20 cases were operated on, with a mortality of 10 per cent. It must be remembered that intussusception is common in hospital practice, but rare in private practice, and this gradual increase in the number of cases brought into hospital is doubtless due to improvement in the diagnosis of the condition to some extent, but in the year 1917 a very big increase in the number of intussusception cases occurred—35 cases being operated on last year as against 23, 20, and 24 in the three previous years, and it would seem likely that this is a direct result of the increased use of various " war foods " and of the irregularities in the food supply that this country has been experiencing recently.

This decrease in the operative mortality down to 19·2 per cent. for the 126 consecutive cases of the last five years is satisfactory, and it is of interest to inquire what the factors are that have brought this about.

During the last 20 years, abdominal surgery of all kinds has undergone a steady decrease in mortality, and this is especially noticeable in the surgery of the acute abdomen. In the last ten years, this decrease in mortality has, as is natural, been less pronounced than in the previous decade, and it is usually held, with good reason, that one of the main factors responsible for the present low mortality of acute abdominal surgery lies in the early diagnosis and early operative treatment which such cases are now beginning to receive. In like manner this has been thought to account for the increasing number of recoveries after laparotomy for intussusception; but this statement is not borne out on examination of the above series of cases, for during the five-year period 1898–1902 the percentage number of cases operated on within 24 hours of the first onset of symptoms was 65·7 per cent., and in the three succeeding five-year periods the percentages of cases dealt with within the first 24 hours were 54·5 per cent., 67 per cent., and 68·4 per cent. There is, therefore, no evidence that the cases have in the average come to operation earlier, to any definite degree, during the last 20 years, and it is probable that there are several other factors which have played a more important part in lowering the mortality.

In the first place, many minor alterations in the technique of abdominal surgery have been, and are still being, introduced from

L

time to time, each of which exercises a beneficial influence on the after-results of the operation; secondly, with regard to intussusception operations in particular, it is only during the last ten years or so that surgeons have come fully to recognize the importance of the time-factor in the case of abdominal sections performed on infants and tiny children, and to realize that every minute saved during the operation of opening the abdomen of a small child increases the chances of its recovery. Thirdly, the harmful effects of general anæsthesia in infants has been taken into account, and every effort made either to reduce its duration to a minimum in various ways which we will describe later, or better, to substitute spinal anæsthesia in its place. It is, therefore, to these three factors that we must look as offering the most probable explanation of the decided improvement in the results of surgical treatment in these cases, rather than to any supposed diminution in the time that elapses before operation is undertaken.

GENERAL FEATURES.

It is not intended to discuss the ætiology or clinical diagnosis of intussusception in this paper, but it may be of interest briefly to record certain features which stand out on analysis of this series of cases.

As regards the anatomical varieties that occurred, I am strongly of the opinion that the common, but misleading, terms " ileocæcal " and " ileocolic " should be dropped, and the simple classification of the disease first suggested by Cuthbert Wallace into varieties known as " enteric," " enterocolic " and " colic," should be adhered to. These terms are self-explanatory, and include all varieties, the rarer forms in which either the appendix, appendix stump, or the caput cæci constitutes the apex of the intussusception, being of course, included in the " colic " variety; those cases in which there were present two or more separate intussusceptions are here included under the heading of " multiple " intussusceptions.

Of these 374 cases, the variety was not stated in 11, 28 were enteric, 33 colic, 288 enterocolic, and no less than 14 were multiple; this somewhat high proportion of multiple or double intussusceptions is of practical importance, and should be borne in mind during laparotomy for this condition.

The comparative rarity of any definite organic cause for the intussusception, such as a polyp, is shown by the fact that in only 11 of these 374 cases was anything of the kind discovered. Adenomatous polyps (one or more) were present in six cases, Meckel's diverticulum in three, a sarcoma of the intestine in one, and the stump of an appendix, previously removed, in one.

In only five cases was there a history of a previous attack of intussusception : recurrence of an intussusception has, therefore, some right to be regarded as a rare event.

With regard to the age of the patients, the following table shows that under six months is the commonest age at which the condition

occurs :—

Between o and 6 months -	-	-	-	122	cases.
Between 6 months and 1 year	-	-	-	112	,,
Between 1 and 2 years -	-	-	-	49	,,
Over 2 years -	-	-	-	91	,,

All the adult cases are included in the last group of 91 cases. The youngest and oldest in the series were respectively 7 weeks and 76 years old.

TREATMENT.

Before the introduction of laparotomy as the routine treatment for intussusception, many and various methods had been advocated. The passage of rectal bougies had been reported by Hilton Fagge as producing a cure ; Taliaferro recorded a case cured by the introduction of effervescing powders into the rectum ; inflation by air pressure or water pressure, external manipulation under an anæsthetic, and the introduction per anum of a mixture of shot and oil have each had their day, and, what is more surprising, their supporters.

For some years now it has universally been admitted that the treatment of intussusception should be entirely operative and that laparotomy should be done at the earliest possible moment. The importance of undertaking an abdominal section at the earliest possible moment is well known, and the evil influence on the mortality of any delay between the onset of symptoms and the performance of laparotomy is well shown in the above series of cases.

The older methods of inflation by air and water pressure are entirely abandoned, though in a few of the earlier cases in this series such means were employed as a preliminary measure before laparotomy was performed in an attempt to reduce the lower part of the intussusception, and thus diminish the amount of intra-abdominal manipulation likely to be required later at the operation. But the most that can be hoped for from such a procedure is that a few of the lowest inches only of the intussusception will be reduced, and it is just this lowest part of the invagination that is so very easily dealt with in laparotomy, a few seconds almost always sufficing to reduce all the lower part of the intussusception. It is, therefore, of very little advantage to the surgeon to find on opening the abdomen that a small partial reduction has already been achieved by means of water-pressure.

OPERATIVE TREATMENT.

The different operations performed in this series are seen in the following table :—

(1) Laparotomy and reduction in 301 cases with mortality 26 per cent.
(2) Laparotomy, reduction and appendicectomy in 30 cases with mortality 40 per cent.
(3) Laparotomy, resection and union in 30 cases with mortality 63·3 per cent.
(4) Laparotomy, resection and artificial anus in 10 cases with mortality

100 per cent.
(5) Laparotomy and lateral anastomosis above and below the tumour
    in 3 cases with mortality 33·3 per cent.

This table bears out the well-known fact that if anything more than the simple procedure of opening the abdomen and reducing the invagination is required, the mortality rises by leaps and bounds; but it also shows that irreducible or gangrenous intussusceptions that require anything more severe than simple reduction are, fortunately, comparatively rare, only 40 cases of the above series failing to be reduced. In other words, 89·2 per cent. of all cases can be reduced on opening the abdomen. The important question whether an intussusception will be reducible or not depends, as is well known, almost entirely on the interval that has elapsed between the onset of symptoms and the performance of laparotomy. Of the above cases, in only one case, in which operation was performed within 24 hours of the onset of symptoms, was a resection necessary; of the cases dealt with between 24 and 36 hours after onset, only two required resection, and of those in which the interval was between 36 and 48 hours four were irreducible. All the other cases, in which an enterectomy was found necessary, had been ill for over 48 hours before operation was performed. In dealing, therefore, with an intussusception in which symptoms have been present for less than 36 hours, one can feel fairly confident that reduction will be possible.

(A)—REDUCIBLE INTUSSUSCEPTIONS.

In the case of a reducible intussusception, surgical procedure varies somewhat. Most surgeons are content to open the abdomen, reduce the invagination and close the abdomen as quickly as possible; of the last 110 consecutive cases of simple reduction in the above series —comprising those of the last five years—the mortality was only 13·6 per cent. Other operators, however, do this and, in addition, undertake some further procedure calculated to prevent the recurrence of the condition. In the case of the enterocolic variety, this usually takes the form of a fixation of the cæcum, either to the anterior abdominal wall or the iliac fossa, with a few sutures; whereas in a case of enteric intussusception the mesentery, which is then usually abnormally long, may be folded or pleated with a few stitches. Neither of these steps can be considered necessary or desirable for reasons which we shall give below. Should there be a polyp or a Meckel's diverticulum present and causing the intussusception, it should be removed.

Moreover, many surgeons make a practice of removing the appendix during the operation, the reasons given for this step being as follows :—

(1) that the appendix is usually red and congested;
(2) that appendicectomy is justifiable when the abdomen is already
    opened, in order to prevent subsequent appendicitis;
(3) that by so doing the promotion of a few adhesions round
    the cæcum is encouraged and thus the cæcum is partially
    fixed and recurrence of the intussusception is prevented.

While admitting that in the case of elder children, of three years

of age or more, there is possibly justification for this step, I cannot too strongly condemn it as a routine procedure in the case of younger children. In a baby, this step involves a definite increase in the risk of operation, as is shown by the fact that in the above series those cases in which an appendicectomy was done in addition to the reduction of the intussusception, showed a mortality of 40 per cent. as against the 26 per cent. mortality of the cases of laparotomy and simple reduction. Nor are the reasons usually given for the procedure convincing. The redness and congestion so commonly seen in the appendix are, it need scarcely be said, merely engorgement due to interference with its blood supply whilst inside the intussusception, and afford no reason for appendicectomy.

As a means of fixing the cæcum, such a step seems very uncertain, nor can the necessity for such a fixation be shown to exist, for of the above 374 cases, in only five instances was there any history of a previous or subsequent attack of intussusception. Of these five cases one child had had two previous operations for intussusception and one child had had three such operations before; moreover, in two of these recurrent cases, the first and second attacks proved, on operation, to be due to different varieties of intussusception. True recurrence of an intussusception does not, therefore, appear to be sufficiently common to justify any additional preventive surgical procedures which at all increase the risk of the operation or prolong its duration. It is probable that the congestion and bruising of the part of the intestine involved, lead to the production of a few adhesions, which are more effective in hindering a recurrence of the condition than any procedures that the surgeon can undertake.

(B)—IRREDUCIBLE AND GANGRENOUS INTUSSUSCEPTIONS.

In the case of an irreducible or gangrenous intussusception, uncommon though it fortunately is, the surgeon is faced with a very different problem.

Of the 40 cases above, in which resection with or without union was performed, there was no instance of recovery in a child under five years old. All of the 21 cases of resection which were under five years old died; whereas among the remaining 19 which were over that age, only six, or 31·6 per cent., died.

Resection, therefore, in children of five or over has a not unduly high mortality, and, although there were none in this series, a certain number of successful resections in children of three or four have been recorded. It should, therefore, always be undertaken in the case of an irreducible intussusception in a child of this age and be followed, if the condition of the patient permits of it, by union of the bowel ends. It is difficult, if not impossible, to draw any distinction between gangrenous and irreducible intussusceptions, for, except in rare instances in which the outermost layer of the invagination is gangrenous, it is practically impossible to say what the condition of the intussusceptum itself may be ; the same treatment should, therefore, be applied to irreducible invaginations whether they can definitely

be said to be gangrenous or not.   If, however, an irreducible intus-susception occurs in a younger child of one or two years of age, the outlook is altogether different, for recovery after resection is practic-ally unknown in a child of this age, and the operation is well regarded as hopeless.

Fairbank and Vickers recorded a successful resection for intussus-ception in a child of seven months in 1910,[1] but such cases are very few and far between—fewer, indeed, than the number of authentic instances in which an untreated intussusceptum has sloughed, and the more or less complete intussusception become detached and been passed *per anum*, with recovery.   A fair number of instances of recovery after sloughing of an intussusception are known,[2] and when encountering an irreducible invagination on laparotomy in a child of under two or three years old, it is well to remember that, slender though its chance of unaided recovery by sloughing is, it is probably greater than the infinitesimally small chance of a resection saving its life.   A third alternative in an irreducible case is the performance of a lateral anasto-mosis above and below the lesion.   This is a proceeding that is seldom done for intussusception—in only three cases of the above series was it performed—and though primarily one might expect that it would entail considerably less shock and manipulation than re-section and union, yet it must be remembered that a lateral anasto-mosis is directed solely towards relieving obstruction, and it is very doubtful whether in an intussusception complete obstruction often exists in the early stages.   Although there is no action of the bowels, except blood and slime, the intussusception usually permits the passage of a certain amount of intestinal contents through it, except in very advanced cases, and it is therefore doubtful whether a short circuit performed simply to relieve obstruction is likely to prove of very great use.   There are other alternative methods which may be adopted if the condition cannot be reduced, but which have not been employed so far sufficiently often to have established themselves as routine procedures :—

(*a*) The operation of excising either the whole or the tip of the intussusceptum from within its sheath—an operation variously named after Jesset, Maunsell, or Barker. For this operation to be possible it is essential that the enveloping or ensheathing layer should be in good condition and not swollen or gangrenous; it does not appear to have been made use of at all in the above series, and is at present very seldom performed in this country.   As an operation, it is distinctly more difficult to perform than simple resection and union, but inasmuch as it involves less manipulation of the parts, it is possible that the shock entailed may be less ; it must, however, be regarded as an operation which is much more feasible in chronic than in acute cases, and in adults than in children.

(*b*) In some cases Israel's modification of the above method may be found of use ; in this, the intussusception is first sutured to the peri-toneum of the anterior abdominal wall, the remainder of the operation then becomes entirely extraperitoneal and the intussusceptum is

removed in whole or part as above, by an incision through its sheath; the bowel may then be left open for a day or two, if required, for drainage purposes, or else closed there and then with two layers of sutures.

(c) Resection may be performed and an artificial anus established; that this is thoroughly undesirable is shown by the 100 per cent. mortality which occurred in the 10 cases of the above series in which it was adopted. Inasmuch as it gives rise almost invariably to a small intestine fistula, it is to be regarded as an operation that is entirely unsuitable in the case of children.

(d) An artificial anus may be formed above the invagination without a resection being done, but this presents no advantage over (c).

(e) Codman has suggested that, when dealing with an irreducible enterocolic invagination, the mesentery leading into the intussusception should be ligatured, a tube introduced into the ileum above, and the whole intussusception sutured up to the anterior abdominal wall. He hopes that by thus cutting off its blood-supply the intussusceptum may shrink, so that in a few days' time it may be possible to remove it by gently pulling it out of its sheath, from outside the abdomen; the continuity of the bowel can then be re-established by suture. This operation has very seldom been performed, but appears to have the merit that shock is likely to be largely diminished by the fact that it is essentially a two-stage procedure, the second and more extensive part of which can be performed as an extraperitoneal operation, owing to the fact that the intussusception has been sutured up to the anterior abdominal wall.

(f) Occasionally, when the invagination is protruding from the anus, or can be felt in the rectum close above, it is possible, by drawing it down through the anus, to remove it on the same lines as a prolapsed rectum. This operation, however, is, as a rule, only possible in cases of chronic intussusception, and usually in those due to a malignant growth in the lower part of the colon.

Whichever procedure is adopted in the case of an irreducible intussusception, it is essential that not only should it be performed as quickly as possible, but that no unnecessary time should be spent in determining whether the invagination is reducible or not; though every effort should be made to reduce the intussusception, it is quite easy to lose valuable minutes in attempting to reduce a case which is really obviously irreducible from the first. It should not be forgotten that if a resection is to be preceded by a prolonged period of handling and squeezing of the bowel in efforts to reduce it, the shock to the patient cannot fail to be all the more profound.

OPERATIVE TECHNIQUE.

There are a few points in the operative technique of these cases that seem worthy of notice. Three great maxims should, without

doubt, be continually kept in remembrance, and these are—

(1) That the duration of the operation, and especially the time during which the peritoneal cavity is kept open, must be curtailed in every possible way that is consistent with careful and accurate work and delicate manipulation.

(2) The duration of general anæsthesia, if employed, should also be diminished as far as possible; if available, spinal anæsthesia should be employed in its stead.

(3) Every possible means must be taken to combat shock, before, during, and after the operation.

ANÆSTHESIA.

There is no doubt that the best results are obtained in these tiny children by the use of spinal anæsthesia, and, if possible, general anæsthesia should not be employed. In a child under one year of age, ·5 cc. of a 2½ per cent. solution of stovaine and glucose injected into the spinal theca opposite the disc between the second and third or the third and fourth lumbar vertebræ produces, as a rule, a completely satisfactory anæsthesia and absolute relaxation of the abdominal muscles Should the child still be restless and inclined to move, he can be rendered sleepy by the administration of a little alcohol, or a few drops of chloroform on a mask in the ordinary way. While I am not convinced that spinal anæsthesia in an adult patient has any very great effect in diminishing shock, in babies its effect in this respect is undoubted, its value in reducing the liability to chest complications extreme, while the assistance it renders to the surgeon in producing complete relaxation of the abdominal muscles can only be realized by those who have experienced it.

If, however, it is decided to employ general anæsthesia, ether should be avoided as far as possible, and every effort made to reduce the duration of the anæsthesia.

Induction should not be begun until every detail is ready—the surgeon and assistant in place, the needles threaded, the patient's skin prepared, and the sterile towels in position. As soon as the peritoneum is sutured, no more anæsthetic need be given; in this way, inasmuch as a baby will only require very few breaths to anæsthetize it, the duration of anæsthesia need only be a few minutes longer than the duration of the operation itself

OPERATION.

Before making the incision every detail should be ready—swabs and plugs at hand, needles ready threaded and ligatures cut The incision should be about 3 in. long, through the right rectus muscle, with its centre opposite to and about one inch to the right of the umbilicus; this incision is better in infants than a paramedian incision with lateral relaxation of the rectus muscle, for it takes less time and gives more room for intra-abdominal manipulations. Before the peritoneum is incised, the assistant should be ready with gauze pads to prevent the intestines from coming out. Some eminent

authorities make no attempt to prevent the abdominal contents from prolapsing, but allow them to do so and wrap them up in warm moist sterile towels. Such a proceeding should, if possible, be avoided, for not only is the shock likely to be increased by undue exposure of the viscera, but—a point which is even more important —considerable difficulty may be experienced in returning the intestines into the peritoneal cavity, especially if the child is straining at all.

On opening the peritoneum, two fingers are introduced and the intussusception felt for ; by means of pressure and stroking movements with these two fingers, a large part of it can usually be immediately reduced inside the abdomen. Indeed, in the case of a large intussusception that has moved far down the colon into the pelvis, a great portion of it must be reduced within the abdomen before it is possible to bring the remainder out and inspect it.

Although the lower part should be reduced within the abdominal cavity, it is essential that the upper and last portion of the invagination to be encountered should be dealt with outside the abdomen where it can easily be seen. This is the stage at which difficulty is likely to be encountered, and unless the intestine is clearly seen and closely examined, it is quite impossible to be certain that complete reduction has been achieved ; moreover, a search has to be made for any abnormality in the bowel at this spot, such as a " leading polyp," a diverticulum, etc., which may have been the cause of the intussusception and may, therefore, require removal.

It is usual after complete reduction of the invagination has occurred, to feel what appears to be a hard mass or ring in the bowel at the point which approximately represents the apex of the intussusception. This is almost always due to local congestion and œdema of the bowel wall at this spot, although it is frequently so hard and dense that it may need a careful visual examination to make certain that it is not a growth or other intestinal abnormality.

It has often been stated that the appearance of the appendix, or of a dimple in the œdematous wall of the cæcum, in the commoner enterocolic type, signalizes the complete reduction of the invagination. But this is by no means always true, and it is common to find that several inches of ileum remain to be reduced after the appendix has made its appearance.

Stress must also be laid on the comparative frequency of double intussusceptions—a rapid examination, which will only occupy a few seconds, should therefore always be made to ascertain if a second invagination is present. When this has been done, all that remains is to close the abdomen, leaving a quantity of warm saline inside the peritoneum. We have already stated that it is neither necessary nor advisable in an infant to prolong the operation by any procedure calculated to reduce the chances of recurrence; although it is very common in enterocolic cases to find that the cæcum and ascending colon possess a long mesentery—the primary developmental fusion of the peritoneal layers having failed to occur—the temptation to

anchor the cæcum, or to pleat its mesentery with a few sutures, should be resisted.

It is well known that laparotomy for this condition is not unfrequently followed by the incision bursting open, and in 15 of the above 374 cases this tragedy occurred. In suturing the abdominal incision, therefore, it is advisable that a certain number of stitches of salmongut should be passed deeply " through and through " the skin and deeper layers. The writer usually employs in these infants a continuous suture of No. 1 silk to close the peritoneum and posterior layer of the rectus sheath ; this is followed by interrupted sutures of salmon-gut at half-inch intervals passing on each side through the skin, anterior rectus sheath, and rectus muscle itself. All of these are introduced before any are fastened, and the anterior rectus sheath is brought together with a continuous buried catgut suture before the salmon-gut stitches are finally tied. These last may then be left in position for 10 or even 14 days before removal, if thought necessary.

AFTER-TREATMENT.

The after-treatment should primarily be directed to relieving as far as possible the shock usually present In general, it is better for the child's arms and legs to be covered with wool and bandages before operation, and to keep these on him for the first day or two afterwards. These tiny children as a rule improve very rapidly if kept continuously for the first few days after operation in a uniform temperature of from 100° to 108° in a hot-air bath, made with a cradle covered with blankets and heated by an ordinary 16-candle-power carbon filament electric light globe. In addition, small quantities of brandy and glucose in saline may be administered frequently by the rectum, and a minim or so of Tr. opii given if they are restless. Almost every case of intussusception exhibits more or less rise of temperature for some days after laparotomy, which is probably due to absorption from the bruised and congested bowel ; this need cause no alarm unless the temperature rises unduly high. Aperients should be avoided for the first four or five days if possible, and are generally unnecessary ; if required, a small dose of pulv. glycyrrhyzæ co. or of castor oil is usually sufficient.

REFERENCES.

[1] *Lancet*, February 3, 1910.
[2] Battle : *Acute Abdomen*, p. 263. Holmes : *System of Surgery*, Vol. 2, p. 722, etc.

A SERIES OF SEVERE CASES OF OSTEO-MYELITIS.

By RONALD A. WALKER.

Late House Surgeon, Isolation Wards, St. Thomas's Hospital.

THE following six cases of osteo-myelitis were admitted to St. Thomas's Hospital during a recent period of seven months. They seem worthy of record, partly as representing a series of extremely severe cases of the disease and still more as illustrating the fact that the patient may be in a severe septicæmic condition before the local focus has manifested itself to any noticeable degree. In three of the cases recorded the bone in which the condition developed later showed little or no signs of suppuration on first operation.

CASE 1.—The patient, a boy with a history of having had a slight blow on the leg with a stick five weeks previously, though little pain was then experienced; three days previous to admission, however, the leg became sore and tender near where it was struck, at the lower end of the tibia. There were no enlarged glands palpable, and no redness, but acute tenderness radiating to the back of the calf of the leg. Immediate operation was decided upon under a general anæsthetic, multiple long incisions being made over the area of tenderness; no pus was found, but a small amount of watery fluid was present in the tissues. The periosteum was laid open and the bone exposed, no pus was found subperiosteally, and as the bone appeared normal nothing further was done. The first day after operation the pain was better but appeared to be lower in the leg; on the second day the leg became swollen, but no pus appeared. The patient was practically comatose, and died two days later. The temperature throughout was high, varying from 101° to 103°.

Post-mortem Examination.—The periosteum of the tibia was stripped up and a small quantity of pus found beneath it; there was a considerable quantity of pus in the pericardium and recent abscesses were present in both lungs. The other organs appeared normal.

Report of Culture of Pus.—Staphylococcus aureus present.

CASE 2.—The patient, a girl, æt. 12 years, with seven days' history of pain in the left foot and ankle, which had suddenly become most acute two days previous to admission. The temperature was high, 104°·6, and pulse 130. There was no history of trauma. The left foot, from the meta-tarsal phalangeal joint to just above the ankle, was swollen and extremely painful, but not red or brawny ; there was some slight tenderness up the calf, but no œdema, no enlarged glands in the groin, and no venous dilatation. The patient was operated on the same evening, multiple incisions being made. No pus was found. After the operation the temperature dropped to 101°·2, but the next day her general condition was not being so well maintained, and as the temperature was again rising a second operation was performed, the incisions being deepened through the periosteum down to the bone, and part of the lower end of the tibia gouged away. No pus was present. As the patient's condition was bad during the next 24 hours it was decided to ampu-

tate the limb below the knee, which was done under spinal anæsthesia with a minimum amount of C.E. After amputation the temperature dropped to 100°, but gradually rose the next day. The patient was given the usual cardiac stimulants but without avail, and she succumbed on the second day after the amputation had been performed.

On examinaion of the amputated part, it was found to contain pus in the ankle joint and tendon sheaths of the sole of the foot, with some slight extension between the muscles of the leg just above the ankle joint.

No post-mortem was made in this case.

Culture of Pus.—Staphylococcus aureus present.

CASE 3.—This patient was a well-grown boy, æt. 15 years, who was admitted complaining of pain and swelling of the right leg, the pain radiating from the knee to the ankle. About a fortnight previously he fell down, his right leg causing him a little pain the same evening; the next morning, although his ankle was slightly swollen, he went to work as usual, but the leg becoming more painful he was advised to come to hospital. On admission his temperature was 103° and pulse 140. The right leg was swollen and slightly red, and fluctuation was readily obtained on the anterior surface. The patient was operated on immediately under a general anæsthetic, a long incision being made on the anterior surface of the leg, pus at once exuding from the wound. The incision was carried down through the periosteum, and pus was found subperiosteally and the middle third of the tibia was found bare bone, the tibia was chiselled away and the medulla opened, pus being found in the medullary cavity, a large opening was made in the medulla for drainage, the wound being syringed with H_2O_2 and 1–60 carbolic. Three drainage tubes and plugs were inserted, and the wound closed. After operation the patient's temperature dropped to 98°, but two days later again rose. On the third day after operation the leg, although draining freely from the wound, became swollen and œdematous just below the knee and the patient complained of pain, a single deep incision down to the bone was made about 5 in, long under gas, pus exuding; the wound was plugged and left open. The next day the patient's condition was much improved and the drainage tubes were removed, the wound being replugged daily for the next three weeks, the wound healing with healthy granulation tissue from the bottom. The temperature remained unsettled for six weeks, then gradually became normal, and the patient got up in the eighth week. At the twelfth week he was able to get about with crutches, and he was discharged to a convalescent home for a month. On his return the leg looked extremely well although still somewhat swollen, and he is shortly to have sequestrum removed.

Culture of Pus.—Staphylococcus aureus.

CASE 4.—This patient, a boy, æt. 8 years, was admitted complaining of pain over the internal malleolus of the left leg, this area being tense and shiny with slight fluctuation. There was no history of injury to the leg of any description, but the general lassitude of the patient had been noticed for about five days. The temperature was 103°·4 and pulse 136. The leg was incised under an anæsthetic, a small amount of pus being drained away; the temperature dropped to 99°·2, but the next day rose to 102°·4, the pulse also rising to 148. A second operation was performed, the periosteum being divided and lower end of the tibia exposed; pus was found subperiostially and in the medulla, drainage tubes were inserted, and the wound partly closed. For five days the patient appeared to be doing well, but on the fifth day a small abscess became evident on the right

chest wall, the pulse became weak, frequently dropping beats and at times uncountable; but on the ninth day, although the cardiac condition improved, the pulse being stronger and no longer dropping beats, adverse chest symptoms developed, rhonchi and crepitations were heard in both lungs, and well-marked broncho-pneumonia in the left lung. A pericardial rub was also plainly audible. The small pyæmic abscess on the chest wall was opened, but the patient's general condition now had deteriorated, and he died on the eleventh day.

Result of Examination of Pus.—Staphylococcus aureus present.

Post-mortem Examination.—The tibia was divided and pus found in the medullary cavity. *Heart.*—Well-marked pericarditis, with fibrin deposit on the heart wall; pus abscess behind the cusp of the mitral valve. *Lungs.*— Pus abscesses present in both lungs, well-marked patch of broncho-pneumonia in the left lung. *Kidneys.*—Small pus abscess in the right kidney.

CASE 5.—Patient, a boy, æt. 4½ years, when first seen was ashen in complexion and obviously in severe pain; six days previous to admission the patient had a slight fall, but apparently did not hurt himself or complain. The temperature was 103°·4 and pulse 160. The left leg was swollen and shiny, fluctuation being readily obtained. The patient was operated on under a general anæsthetic, an incision about 6 in. long was made over the anterior surface of the shaft of the tibia, and pus at once exuded through the wound. The anterior surface of the tibia was exposed and found to be bare of periosteum; the wound was deepened and pus was found to extend from the upper to the lower epiphysis, being subperiosteal except a small area on the posterior surface of the tibia. As the shaft was found to be movable between its epiphyses it was decided to perform a "sub-periosteal resection of the shaft of the tibia"; the small amount of periosteum on the posterior surface having been loosened with Farabeuf's rugine, the bone was easily lifted out between its epiphyses. The bone having been removed, the wound was washed with H_2O_2 and 1–60 carbolic, three large drainage tubes were inserted and the wound closed. The post-operative condition of the patient was good, considering his general condition. The patient's general condition and temperature were satisfactory, and the drainage tubes were removed on the seventh day; but on the ninth day he developed a trying cough, the temperature rose and the respirations were feeble and rapid, but there were no definite signs in the chest. On the twelfth day a definite area of dulness was found at the left apex; this was aspirated, turbid fluid being withdrawn from the pleural cavity. After the aspiration there was some slight improvement, but the temperature showed no signs of settling and rose to 103°, and it was decided to aspirate the left base; this was done, fluid being again withdrawn. An X-ray examination of the chest showed the pericardial area decidedly enlarged, and it was decided to resect a rib and drain the pericardium. The fourth costal cartilage was resected under a local anæsthetic (novocaine) and the pericardium was aspirated, clear fluid being withdrawn. The two following days there was considerable improvement, the patient talking and taking interest in things around him. The wound was now doing well, the stitches were removed and the wound closed with granulation tissue. From this time the patient did extremely well, being discharged to a convalescent home at the twelfth week.

Culture of Pus.—Staphylococcus aureus.

Pleural Fluid.—Staphylococcus aureus.

X-ray Reports.—9th day: "Complete removal of shaft of the tibia, only

epiphyses showing." 14th day : Slight new bone formation. 20th day : Definite new bone formation of the shaft of the tibia.

Case 6.—The patient, a boy, æt. 13 years, walked up to the out-patient department of the hospital, complaining of pain in his right leg above the knee. A month previously he had a fall and stated his leg felt stiff the next day. The patient looked extremely ill, and his temperature was 104°·6 and pulse 120. On examination there was diffuse tenderness over the right femur and slight thickness over the great trochanter, no redness or œdema. The patient was operated on the same evening, an incision being made over the great trochanter of the right femur, the bone exposed, and the periosteum, which was considerably thickened, removed and part of the bone chiselled away; a small amount of pus was found, a drainage tube was inserted, and the wound closed. The temperature dropped to 102° during the next four days, but the patient complained of his left ankle on the fifth day. The ankle was considerably swollen, and as the temperature showed no signs of settling it was decided to perform a second operation. An incision was made at the level of the ankle joint on the anterior surface of the left leg, the bone exposed, and the periosteum scraped away, pus exuding from the tibio-fibular joint. The ankle joint was then exposed and opened, a large quantity of pus exuding. The lower end of the tibia was opened, pus being found in the medulla ; all diseased bone was removed, the wound washed with hydrogen peroxide, drainage tubes inserted. and the wound partly closed. During the next five days the patient appeared to improve, the temperature dropping and general condition improving, the wounds both draining freely ; but on the sixth day after operation the patient became quite delirious and remained in this condition during the next ten days, when he became more normal, being able to talk and point out where he felt pain. The wound in the left leg drained pus most profusely, and the patient complained of severe spasms of pain in the right leg and of aching pains in both arms and shoulders. His general condition was now becoming much deteriorated, the temperature high, up to 104°·2, and the pulse small in volume and rapid. The patient again became delirious, and remained in this condition until his death, which occurred in the fourth week after admission. The patient was given nine injections of anti-staphylococcus serum at varying intervals, and the usual cardiac stimulants ; during the last week the pain was so severe that morphia was the only remedy which gave any relief.

Report on Pus.—Staphylococcus aureus present.

Post-mortem Examination.—Solid pneumonia in both lungs ; no sign of pulmonary abscess. Pyæmic abscess in buttock. No pericarditis present.

It seems almost remarkable that such a series of severe cases should be met in so short a space of time, and that there should be no sign of local focus in any of them. The staphylococcus aureus was the organism present in each instance. It seems only reasonable that, were one to hazard a suggestion as to the possible cause, in these unusual times the children are, through strange diet and other causes, below par, and thus more easily susceptible to a slight injury resulting in a severe illness, and that those patients who were old enough to work were doing so at a higher pressure than their nourishment was adequate for, the result being the same in both cases.

THE TREATMENT OF HÆMOPHILIA.

By J. D. R. MONRO, M.D.

Surgeon to East Finchley and Muswell Hill Dispensary.

TRUE hæmophilia is a rare disease, and fortunately so, because up to the present it has baffled the efforts of medicine to explain its nature, or establish the treatment on a well-defined plan. During the past two years I have had a family of hæmophilics under my care, and the story of these cases has been instructive. Hæmorrhages have been frequent, and always difficult to deal with. The chief object of this paper is to put before the profession the remarkable result of using emetine in checking the bleeding on one occasion.

There are four children in the family—the eldest, a young man of 23, and the second, a youth of 21, are both hæmophilic; the third, a daughter of 18, and last, a boy of 11 are not affected. As to family history, the only important fact is that the mother's brother died at the age of six from hæmorrhage caused by extraction of a tooth.

The two hæmophilic lads have severe hæmorrhages in various parts of the body at frequent intervals. A slight scratch is to them a serious thing; the dentists have refused to extract their teeth from fear of bleeding; they have both much caries, and pieces of teeth break off from time to time and cause severe hæmorrhage. The periodic bleedings are mostly in the joints, and round about the joints,—the knees, elbows, wrists, and shoulders being most frequently affected; they occur, on the average, about three times a year, and each attack means an illness lasting about a month. The younger of the patients has been " doing his bit " in the war by driving a car at military camps, but is greatly discouraged by having to break off his work suddenly, when a hæmorrhage begins, and make for home and bed. His last attack was a hæmorrhage in the eyelids that made him for a fortnight look as if he had a bad black eye. The elder patient is much more of an invalid than his brother. After surviving many bleeding attacks during the time of teething, he suffered, at the age of 12, from hemiplegia of the right side, due presumably to a hæmorrhage in the brain. Recovery from this was very slow; the right hand remains weak, and the right leg is easily tired, so that the lad cannot walk more than a quarter of a mile at a time. Some time after the cerebral hæmorrhage he began to suffer from epileptic fits, and he continues to have these two or three times a month.

Treatment of the attacks of hæmorrhage is always a matter of difficulty. When the joints are affected, the application of evaporating lotions, with bandaging and rest in bed, have served to stop the bleeding, and cause absorption of the effused blood. When the bleeding has been

from internal organs, local remedies are unavailable, and we have to fall back upon drugs. In past years my patients have always been given ergot, but it has been doubtful whether it has had much influence in checking the hæmorrhage. On the last occasion, emetine appeared to have such a beneficial effect that it seems worthy of further trial.

My patient began to pass blood in his urine last March. From the fact that pure blood followed the act of micturition, we judged the bleeding spot to be either in the urethra or the neck of the bladder. The lad was kept in bed, and every remedy mentioned in the text-books was tried, without result. Dr. C. O. Hawthorne saw the patient with me, and gave valuable help throughout. First we tried calcium chloride, then calcium lactate for ten days, then we gave ergot, gradually increasing to large doses, then mixtures of liq. ferr. perchlor. and other astringents. Adrenalin by mouth and hypodermically gave no result, nor gelatin. Then pituitrin injections were tried for a week, and thereafter we gave horse serum by the mouth, and later in doses of 15 to 20 cc. hypodermically—all without any improvement. By the middle of the ninth week of hæmorrhage, patient's condition had become very serious. He was quite blanched, his face like his pillow in colour. He had had epileptic seizures for some days, and now they became almost continuous; his temperature rose to 104°; he was dull, listless, and difficult to rouse, and his pulse-rate was 140. I thereupon gave him emetine hydrochloride, ½ gr., by hypodermic injection in the forearm. The result was remarkable. Next morning patient was in a profuse perspiration; he complained of pains in his joints, and his arm was swollen. The urine was scanty and still bloody; the temperature had fallen to 100°. The day following his temperature was normal, the joints were better, and he passed normally coloured urine—the first for exactly ten weeks. From that time patient has made a steady recovery, and he is now able to be taken out in his bath-chair as usual.

A LARGE RETRO-PHARYNGEAL SWELLING DUE TO AN ANEURYSM.

By GORDON W. THOMAS, M.B., B.S., F.R.C.S.

Hon. Assistant Surgeon, Clayton Hospital, Wakefield, and formerly Res. Casualty Officer, Leeds General Infirmary.

OWING to its rarity, and unusual features, the following case seems worthy of record :—

Mrs. H., a married woman, æt. 32, was seen by me, in consultation with Dr. S. Reader, early in February last, on account of a swelling in her throat and neck. The swelling was first noticed in the throat about ten weeks previously; it caused a good deal of difficulty in swallowing, but there was no pain. The patient looked thin and anæmic, and could only speak in a whisper. On examination, there was a large smooth swelling on the right side of the pharynx, pushing the tonsil decidedly forwards, and reaching well over towards the left tonsil. The swelling was clearly retro-pharyngeal; it did *not* pulsate, but was soft and fluctuating, and not tender. It was covered by mucous membrane which was quite normal in appearance. Dr Reader had attempted to open it both with a knife and with sinus forceps, but each time only a little blood had escaped. There was, in addition, a swelling below the angle of the jaw on the right side. This was deeply situated, not well defined, non-pulsating, and fluctuating. The patient could move her head freely and painlessly in all directions.

There was no tenderness over the cervical spine. An excellent radiograph, taken at the Clayton Hospital, Wakefield, revealed no evidence of disease of the cervical vertebræ. The patient was admitted to the Clayton Hospital, and operation performed on February 21. An incision, about 1½ inches, was made over the upper part of the right sternomastoid, in the line of the muscle, its fibres split, the internal jugular vein found and drawn outwards. The swelling was then encountered. It was rather thin-walled, fluctuating, and non-pulsating. A small incision was made and forceps introduced; but instead of pus, as was expected, there was free hæmorrhage. The blood, evidently arterial, issued in a steady stream. The edges of the incision in the sac wall were clipped together, and this stopped the hæmorrhage for the time being. The skin incision was then prolonged downwards, and the lower part of the swelling defined, and found to be in close contact with a large vessel (internal carotid) from which it was separated. The extreme lower end of the swelling, which narrowed somewhat, was next divided between ligatures. It was then seen that what had been divided was the external carotid artery, near its origin; for the common carotid, internal carotid, and stump of the external carotid arteries, were now all clearly visible. The clip was next removed from the opening in the sac, and hæmorrhage did not recur. On introducing a finger the sac was found to pass inwards, deeply, in front of the cervical vertebræ; its lining wall was smooth, and there was no evidence of caries of the spine. The sac was then swabbed out with gauze, and, *although little or no clot came out*, hæmorrhage recurred freely. The sac was, therefore,

M

separated quickly from the surrounding tissues by the finger, and removed piecemeal, the last (deeper) portions consisting of *old* blood clot (the hypoglossal nerve, curving forwards in front of the middle of the sac was meanwhile hooked downwards out of the way). Hæmorrhage now ceased *spontaneously.* A small drain tube was inserted, the sternomastoid sutured with catgut, and the wound closed. As the patient was collapsed owing to the hæmorrhage, she was infused intravenously ($1\frac{1}{2}$ pints) and given liq. strych. m.x and 1 cc. pituitary extract, hypodermically, after which her condition improved.

On February 24 (three days after operation) there was rather free hæmorrhage from the wound. This was stopped by removing the tube and packing with gauze. The latter was changed on February 26 and again on February 28, and left out altogether a few days later. The patient left hospital on March 16, with the wound soundly healed and the swelling in the throat much smaller, but still evident. On April 17, the swelling had practically disappeared, but patient can still only speak in a whisper.

<center>COMMENTS.</center>

(1) The *diagnosis* of this case was not easy, and was not, in fact, made till operation. It is clear that the condition was an aneurysm of the external carotid artery, but this was not suspected :—

> (i) because there was no pulsation,
> (ii) because the swelling in the throat was large and that in the neck only small.

The condition is very rare, and, as a cause of retro-pharyngeal swelling, is not mentioned in Rose and Carless's *Surgery.* Jacobson in his *Operations of Surgery* (5th ed., Vol. I., p. 754), quotes two cases, in one of which there was a *pulsating* swelling below the right mastoid process, which pushed the R. tonsil " somewhat inwards." In the present case, there was nothing suggesting that the condition was due to breaking down growth or gumma, so it was assumed that an abscess was present, although no signs of cervical caries could be found.

(2) The hæmorrhage which recurred during swabbing out of the sac after ligature of the external carotid, no doubt originated from anastomoses of branches (facial, etc.) with the companion vessels of the opposite side. These branches should have been ligatured, but this was impossible, for the patient was collapsed and the operation had to be completed quickly. Moreover, ligature did not seem necessary as, after the sac was removed, the hæmorrhage stopped *spontaneously.* The reason for this is not very clear, unless the temporary weakness of the circulation accounted for it, because further hæmorrhage *was* possible, as was shown by its recurrence three days after operation.

(3) The *cause* of the aneurysm, in a comparatively young woman, with none of the usual predisposing causes, was not at all clear

THE "ALLEN" TREATMENT OF DIABETES MODIFIED BY THE ADMINISTRATION OF ALKALIES IN FULL DOSES.

By T. E. MULVANY, M.R.C.S., L.R.C.P., *Capt. R.A.M.C.(T.)*

THE following short history of a case of diabetes, which apparently terminated in recovery, appears of some interest. The details are imperfect, owing to difficulties which made full observations often difficult—sometimes impossible.

March 23, 1917.—O. S., aged 19. Wounded September, 1916, both feet. Left foot healed. Small sinus on right foot. Since September, 1916, he has lost 30 lbs. Prior to March 23rd, he had been six weeks in hospital suffering from diabetes. He drinks a large amount of water, has an extraordinary appetite, and is emaciated in appearance.

March 25.—"Allen" starvation started. Heavy sugar reaction.

March 27.—Slight trace of sugar by qualitative Fehling's test.

March 28.—Heavy sugar reaction. Two eggs allowed.

March 29.—Sugar-free. Meat, one egg, and green vegetables.

March 30.—Sugar-free.

April 3.—Heavy sugar reaction.

June 21.—Sugar still present, but looks and feels better. Diet :—Meat, eggs, green vegetables, tea, coffee, bovril, whisky, and one slice of toast.

Aug. 1.—Sugar, by Fehling's method, 1 g. 3.

Aug. 11.—Laboratory report :—Urine, acid ; sp.g., 1014 ; albumen present ; casts ; sugar in quantity.

Aug. 16.—Urine, acid ; sp.g., 1034 ; no albumen ; sugar, 5·5 per cent.

Sept. 13.—Urine, acid ; sp.g., 1038 ; sugar in abundance.

Oct. 23.—Urine, acid ; sp.g., 1030 ; no albumen ; sugar in abundance.

Nov. 13.—For a week previous to this he had been developing in steadily increasing severity the following symptoms : Headache ; anæmia ; hot dry skin ; pyrexia ; pulse full and frequent, 120 ; tendency to stupor. Urine loaded with sugar, and a very decided acetone odour in the breath. I considered that he was going in for diabetic coma, and since this condition is attributed to the excessive withdrawal of alkalies from the system, possibly combined with the sugar, and as the most promising treatment in diabetic coma appears to be the administration of alkalies, I determined to try and anticipate coma by combining starvation, which on the previous occasion had not met with great success, with alkalies in full doses.

Nov. 13.—No food of any kind. Free use of water. Whisky, one ounce every four hours. A teaspoonful of bicarbonate of soda in a tumblerful of water every four hours. Rectal salines twice daily.

On the Third Day of Starvation.—Urine, sp.g., 1022. Sugar present, but precipitate much lessened. Acetone odour pronounced. General condition much improved.

Fourth Day of Treatment.—Urine, sp.g., 1018. No sugar. Acetone odour less pronounced. Extract of beef, one pint.

Fifth Day.—Urine, sp.g., 1018. No sugar. One pint of milk added.

Sixth Day.—Urine, sp.g., 1010. No sugar. Milk increased to four pints.

Ninth Day.—Urine, sp.g., 1010 ; four pints in 24 hours ; no sugar. Meat, four ounces. Greens, four ounces. One egg. Milk, four pints.

There has since been a steady improvement in health and no sugar in his urine. On January 26, his alkaline treatment was stopped, and he was put on ordinary diet. I last saw him at the end of March, when his general health was excellent, and he was still sugar-free.

Practical Notes.

THE TREATMENT OF SCABIES.

Dubreuilh calls attention to the many cases of this disease now occurring in civil practice among the better class. It is very prevalent among the troops, and officers and men bring the infection to their homes when they return on leave. When any one of the classical methods of treatment is properly carried out, the disease is easy of cure, so that this frequency of attack is evidence of defective treatment. There are commonly supposed to be three essentials in treatment : a hot bath, scrubbing the skin with a brush and soft soap, and the application of an anti-sarcoptic ointment. Although the first two of these are popularly held to be indispensable, the real essential is the proper application of the ointment. This is seldom, if ever, done thoroughly by the patients themselves or by the bath attendants in the hospitals. The bath and the scrubbing with soft soap are useful, but have their limitations. They tend to soften the skin and to open up the tracks of the parasite ; but some parts of the body, such as the female breasts, the penis, the palms and the soles, are too sensitive for vigorous application, whilst other parts like the interdigital spaces and the folds and creases are difficult to reach for the purpose. Soft soap, moreover, is an irritant.

The patient, in applying the ointment, only recognizes the more obviously affected parts, which are usually eczematous. He rubs it well into the arms, forearms, the chest, thighs, and legs. He keeps up a daily application for weeks, with the result of changing his itch rash into a drug rash, and the ointment irritates the usual eczematous condition severely. Other regions, like the hands and penis, are not attended to, so that the parasite continues to exist there.

The hands are usually washed after applying the ointment so as to avoid soiling the clothes. As a consequence, in obstinate cases and in relapses treated in this way, the disease will be found still to be active in the hands, particularly in the palms.

In hospitals the bath attendant errs, partly by ignorance and partly because he has too little time to devote the necessary attention to the large number of cases, each of which requires twenty minutes for an effectual application.

For effective treatment the ointment must be kept applied as long as possible, and Dubreuilh orders his patients to wear on their hands and feet gloves and socks well covered with ointment, and to keep them on all night. The bed-linen and the night gear, as well as the under-linen worn during the day, should be changed, because on these are found wandering parasites in all stages. The female sarcoptes can live at least 24 hours outside the body. The usual washing of these articles is quite enough to disinfect them. The ordinary clothes worn during the day need no special precautions.

When there is much irritation of the skin present, and it is covered with pustules, impetigo, or ecthyma, treatment must first of all be directed to removing these before the ointment can be applied. A full bath, containing

100 g. each of sulphate of copper and sulphate of zinc, should be taken daily, and followed with a plentiful application of zinc ointment. The crusts are soon loosened, and the ulcerated patches disinfected, so that in a few days the inflammatory condition has subsided and the parasiticidal ointment can be rubbed in.

With regard to the ointment to be used, there are many of good effect. What is of most importance is not what is given, but the way in which it is given. Dubreuilh prescribes the following :—

Naphthol B. -	-	-	-	-	-	10
Balsam of Peru,						
Precipitated sulphur,						
Soft soap	-	-	-	-	- of each	20
Lard	-	-	-	-	-	200

This quantity is used up in the three applications to be made every other night. These must be plentiful and general, using of both hands, and making certain that not a square centimetre of the surface of the body, from the chin to the sole of the foot, has escaped attention. The face and scalp are never attacked, and the middle of the back scarcely ever. The ointment must be rubbed in well, and not merely spread on, the hands and feet receiving particular attention. A quarter of an hour, or twenty minutes, should be spent over the application. The patient then puts on the gloves and socks, and goes to bed in clean linen. A bath on the following morning will remove what is left of the ointment. The application is repeated on the third and the fifth day, putting on clean linen on the first and the last day of treatment. Any subsequent irritation will soon be put right by starch-baths, or by an ointment of zinc oxide and coal tar.—(*Journ. de Méd. de Bordeaux*, July, 1918.)

INJECTIONS OF SACCHAROSE.

L. Monaco, the head of the Institute of Physiological Chemistry in Rome, has been observing for the last ten years the effect of sugar upon the secretions, lacteal, salivary, gastric, and the rest. Injections of large doses lessen these secretions, whilst small doses increase them. Sammartino has shown, too, that injections of sugar have an effect upon the coagulation of the blood. Lorentino has observed their effect in heart disease and in internal hæmorrhage. Other observers have reported results in cholera and inanition, in the treatment of wounds, in the treatment of gonorrhœa, cystitis, and in pulmonary affections. In the latter, these injections lessen the bronchial secretion, and are of effect in bronchiectasis as well as in cavities in the lung. A daily injection is given intra-muscularly of 2·5 g. dissolved in 5 g. of water. This is painless, and may be continued for several days without giving rise to any trouble. The decreased amount of secretion improves the state of the cavities, whilst there are less cough and less night sweats.

Lucherini has made special observations on the action of sugar in tuber-culosis. His conclusions may be summed up thus. Intra-muscular injections of 5 cc. are quite painless. There is a gradual diminution in the amount of the bronchial secretion. No alteration is brought about in the foci. There is no effect on the temperature-curve. There is less cough and less sweating at night. Anaphylaxis need not be feared.—(*Journ. des Praticiens*, August, 1918.)

Reviews of Books.

Radiography and Radio-Therapeutics : Part II., Radio Therapeutics. By
ROBERT KNOX, M.D. London : A. and C. Black, Ltd. 15s. net.

THE paging of this volume is continuous with Vol. I., but in every other
respect it is an independent text-book, and may be read as such by those
interested in radiations on their therapeutic side only. The description of
apparatus, though brief, is sufficiently repeated to make reference to the
first volume unnecessary. This separate and full treatment of radio-
therapeutics is much to be commended—as the prevalent practice of
tacking a few pages of " notes on treatment " to the end of a work on radio-
graphy is to be condemned. The connection of the subjects is to a large
extent artificial, and due to the fact that, in the past, identical apparatus
has been used both for photography and treatment. Dr. Knox has em-
phasized the importance of the therapeutic aspect by devoting 200 pages
to its exposition, and has brought into prominence the importance of
" combined treatment," not only by various kinds of radiation and other
electrical procedures, but by every resource which medical experience has
shown to be beneficial in the particular disease under consideration.

This seems to the reviewer a most important advance, and a sign of
reaction from a too narrow specialization. Nature does not recognize our
artificial distinctions. As Dr. Knox says, a patient may fail to respond
to radiation treatment because his blood is lacking in iron, and he will not
be cured until this is remedied in the usual manner. The importance of
co-operation between the radiologist and the general practitioner is thus
made clear. It is not the business of the former to prescribe drugs, but
it *is* his duty to make such suggestions to the practitioner in charge as his
experience warrants.

The book deals extensively with the treatment of cancer, and holds
the balance even between X-rays and radium. The author believes—rightly
in the opinion of the reviewer—that the rapid progress which is being made in
X-ray technique will, in the near future, lead to the abandonment of radium
for external applications, allowing us to use the limited supply almost
exclusively for internal conditions, such as œsophageal cancer.

Much attention is devoted to the treatment of exophthalmic goitre, and
the view expressed, in agreement with that of Hernaman-Johnson, that
small frequent filtered doses of X-rays are necessary in most cases, and
that no visible skin reaction need be caused. Treatment by radium is also
considered, and advised for bedridden cases.

There is a section dealing with the use of radiations in war injuries.
The beneficial effects of light and X-rays in foul and sluggish wounds are
insisted on. In connection with plastic surgery of the face, the grafting
of skin which has been epilated by X-rays is described as having been a
great success. The reviewer ventures to think that judgement should be
withheld in this matter. No doubt need be thrown upon the excellence of
the *immediate* results ; but the border line between safe permanent epilation
by X-rays and the production of telangiectasis is, at best, a fine one, and
one would suppose that surgical trauma would make it still finer.

Bad results, when they occur, are not evident for months, or even a
year or two, so that it would be well to wait awhile before adopting the
practice generally in plastic surgery—especially as the safe if tedious proce-
dure of electrolysis, previous to the removal of the graft, is feasible in a

large number of such cases.

A Text-book of Radiology. By EDWARD REGINALD MORTON, M.D. Second
edition. London : Henry Kimpton.

THE new edition of this work retains the features of its predecessor.
It is probably the best book on the market for the medically qualified
beginner, and is also in large part suitable as a text-book for the lay radio-
grapher. More than one half the book is devoted to apparatus and technique.
The descriptions are clear and not too lengthy. Dr. Morton praises the
electrolytic break for recognized radiography, and expresses the belief
that it will return to favour. With this opinion the reviewer agrees. Given
efficient valve tubes, and a convenient switch to " throw in " the electrolytic
break and make all necessary changes with one movement, these inter-
ruptions give every satisfaction. In referring to the Codlidge tube, the
author states that the necessity of using a separate battery of accumulators
to heat the spiral is a grave disadvantage. It is, but there are now in use
several methods of heating direct from the main, whether direct or alter-
nating, so that this objection no longer holds.

The pages dealing with examination of the lungs are well written.
Dr. Morton holds the view that deep shadows at the roots always indicate
that tuberculous invasion has occurred at some period or another. He is of
opinion that the presence of small rounded opacities at the intersection
of striæ indicated active tubercle, and that it may sometimes be thus
detected before it is apparent clinically. With these statements the reviewer
is in agreement.

The illustrations to the section dealing with the alimentary tract are
not at all good, and, in the case of the stomach and duodenum, appear to
have been reproduced from plates which occupied several seconds in the
taking, whereas nothing over half a second can secure a sharp picture.

The last few pages of the book deal with treatment, and would have
been much better left out. Such a vast subject does not admit of being
dealt with at the tail end of a small text-book on radiography.

A Handbook on Antiseptics. By H. D. DAKIN, D.Sc., F.R.S., and E. K.
DUNHAM, M.D. Pp. x and 129. London : Macmillan & Co. 7s. net.

THIS little book gives an excellent account of the principal antiseptics,
their chemical nature, disinfectant potency, practical uses and the condi-
tions modifying their action. The first chapter deals with general principles,
the laws of disinfection, influence of media, choice of antiseptics and modes
of their application. Chapters II. to VI. deal with the various antiseptics,
the chlorine group, the phenolic group, the salts of the heavy metals, dyes,
and miscellaneous antiseptics such as iodine, boric acid, formaldehyde,
permanganates and various organic substances. In Chapter VII. the
methods employed in testing disinfectant action are discussed, and in the
final chapter certain special applications of antiseptics are considered.

Small as the book is, we know of no better summary on the subject of
disinfection.

The Diagnosis and Treatment of Venereal Disease in General Practice. By
Lieut.-Col. L. W. HARRISON, R.A.M.C. Pp. 482, 16 coloured plates,
84 figs. London : Oxford University Press, 1918. 21s. net.

THIS book is written by an army specialist in venereal disease for the
instruction of the general practitioner in the technique of the methods of
diagnosis and treatment carried out in the Army Medical Service. This is

not an easy proposition, for it is one thing to treat venereal diseases in the Army, where time and expense do not trouble patient or doctor, and where all patients are under discipline, but it is quite another thing in general practice. Nevertheless, the importance of a working knowledge of venereal disease to all members of the profession is difficult to over-estimate. Colonel Harrison's book contains much information of practical value and many useful hints, but it appears to us to be too discursive for a practical hand-book and too dogmatic for a treatise. A smaller book, with the practical portions more condensed and the controversial matter omitted, would have fulfilled its object better. One of the dogmatic assertions to which we take exception is that salvarsan " kills off " the spirochætes in syphilitic lesions. There is no recognition of the researches of Noguchi and others which show that under the action of salvarsan the spirochætes break up into granules which, under suitable conditions, may develop again into the spirochætal form. The disappearance, therefore, of spirochætes from syphilitic lesions does not necessarily prove that they are all killed. As regards the Wasser-mann reaction, the author warns against the tendency to regard every lesion as syphilitic on the strength of a positive reaction; but he is a firm believer in the reaction as a test of the results of treatment. Opinions on this question differ, but we think the statement (p. 278) that a negative reaction at the end of a course of treatment is a better indication of its effect than one a month later, is not in accordance with the views of most clinical pathologists, who attach little or no importance to a negative reaction immediately after a course of treatment, for the reason that the reaction is inhibited by the presence of arsenic or mercury in the blood.

The Prevention of Venereal Disease. By OTTO MAY, M.A., M.D., M.R.C.P. Pp. 240. London : Frowde, Hodder and Stoughton. 7s. 6d. net.

IN this book the author gives an impartial criticism of the various measures—educational, therapeutic, and legal—which have been introduced in the campaign against venereal disease. The subject is one of national importance, especially as the incidence of these diseases is undoubtedly on the increase as a result of the present war and its social consequences. As regards the different measures proposed to combat venereal diseases, while the author thinks that much can be done by educational and social reform and also by providing facilities for efficient treatment, he is of opinion that these measures are insufficient, and is in favour of artificial prophylaxis. He remarks that " the campaign against these diseases will never be brought even to an approximately successful issue so long as the assistance of this legitimate and valuable ally is deliberately declined." The chief argument brought forward against artificial prophylaxis is that it would lead to greater sexual promiscuity, and, by false security—no method being infallible—result in a greater incidence in disease. This, as the author points out, is an *a priori* argument; the only test is the result of practical experience. Moreover, the same argument might equally well be brought against the provision of free treatment for venereal diseases. The practical difficulty in carrying out prophylaxis lies, curiously enough, with the new Venereal Diseases Act of 1917, which makes the sale of any " chemical and officinal preparations whatsoever, to be used or applied externally or internally as medicines or medicaments for the prevention, cure or relief of any venereal disease " a penal offence ! The author is not in favour of the notification of venereal diseases, and his reasons appear to be perfectly valid. Discussing the problem of prostitution, he considers that prostitution, as distinguished from sexual immorality, is largely the outcome of women's economic position

in the past, a state of affairs which is rapidly undergoing change. We can cordially recommend Dr. May's book as a clear and concise exposition of a difficult problem, the importance of which is now becoming more generally recognized.

Clinical Disorders of the Heart Beat. By THOMAS LEWIS, M.D., F.R.C.P., Pp. 120. Fourth edition. London : Shaw and Sons.

THE appearance of the fourth edition of this volume is at once evidence of the eagerness of the profession to become acquainted with the clinical bearings of modern cardiology, and the satisfactory manner in which this desire is met by the author. Dr. Lewis fully recognizes that " the pursuit of the graphic method requires special manipulative skill and experience . . . but it behoves a practitioner to grasp new principles and to be conversant with knowledge bearing on common maladies " (Preface, 5). We have favourably reviewed previous editions. The illustrations are excellent and the index good.

Blood Pressure : its Clinical Applications. By GEORGE WILLIAM NORRIS, A.B., M.D. Third edition. Pp. 447. Philadelphia : Lea and Febiger.

THE importance of careful records of blood-pressure in Clinical Medicine is fully recognized, and to those who desire an up-to-date account of the subject the book before us will appeal. Chapter 1 deals with the physiology of blood-pressure. Chapters 2 and 3, on instrumental estimation of blood-pressure, contain much valuable information; but the multiplicity of instruments described and illustrated will appeal to the laboratory worker rather than the clinician. Chapter 6 on arterial hypotension; 7 and 8 on blood pressure in acute infections, and 9 on exogenous intoxications are full of practical interest. Under the latter heading, the much-discussed question on the effect of tobacco on blood-pressure is well gone into, the general conclusion being that the case against this " drug " as a cause of hypertension is " non-proven." The author summarizes his conclusions thus : " Tobacco, then, should be forbidden, or its consumption limited, when (1) we wish to spare the heart, cardiac, renal, pulmonary disease, etc.; (2) in arterial hypertension; (3) in arteriosclerosis." Chapters 10, 11, and 12 deal with blood-pressures in various pathological conditions. Chapter 14, on the effects of drugs and glandular extracts on blood-pressure, will be referred to again and again by the practitioner, while the alphabetical arrangement of them will render reference easy.

The remaining chapters are on metabolic diseases, diseases of the nervous system, surgery, obstetrics, and opthalmology, and the bearing of the subject of the book on these conditions.

The publishers are to be congratulated on the get-up of the volume.

Hysteria or Pithiatism, and Reflex Nervous Disorders in the Neurology of War. By J. BABINSKI and J. FROMENT. Translated by J. D. ROLLESTON, M.D. Edited with a Preface by E. FARQUHAR BUZZARD, M.D., F.R.C.P. 37 figures and 8 plates. Pp. 311. London : University of London Press, Ltd. 6s. net.

THIS is a valuable book. It deals with a subject which has been of unanticipated importance during the war, and knowledge of which is still far from being sufficiently widely diffused among Army medical officers. The methods of treating functional neuroses in the Army have been very much improved during the past year, but there is no doubt that even now many hysterical cases are being kept in hospital either as a result of faulty diagnosis

or failure to apply appropriate remedies. This book contains a detailed description of the symptoms, pathology, and treatment of hysteria, or pithiatism as Professor Babinski prefers to call it (from πείθω, " persuade," and ἰατός, " curable "), and reflex nervous disorders, two groups of functional manifestations between which the authors draw a sharp distinction. The essential characters of hysteria they regard as the absence of vaso-motor changes and the curability of the condition by suggestion. Reflex nervous disorders, on the other hand, they consider to be associated with vaso-motor changes, and are characterized by their failure to yield to suggestion. In recognizing these disorders as a separate class, the authors have gone back to the earlier views of Charcot and Vulpian, who held that the condition arrives from a reflex disturbance of the spinal centres following a peripheral irritation.

The pathology of reflex nervous disorders is admittedly undecided, and the general tendency of English neurologists is against drawing a distinction between these cases and those of undoubted hysteria. But while this is so, the clinical distinction between the two conditions is most definite and, when recognized, forms a useful guide to treatment. A typical reflex nervous contracture of the hand, for instance, is found to develop after a wound or injury of the limb. The fingers may become crowded together, with paresis, some atrophy of the muscles, changes in the colour of the skin, coldness of the surface, changes in the reflexes, and other vaso-motor and sometimes trophic changes. Unlike the hysterical patient who can be cured in a single sitting, the sufferer from a reflex nerve disorder may be treated for a long period with all the recognized methods of suggestion without producing any appreciable effect. On the other hand, continuous extension, gentle and methodical movements, balneotherapy, hot air douches, and light baths have all been found of value in the treatment of these conditions. Further research will, no doubt, determine whether the separation of these two classes is based upon a real pathological difference or whether they are merely extreme forms of one and the same condition. Nevertheless, it may be said without hesitation that this volume contains information of the highest practical importance, and should be in the possession of all medical officers who are in charge of orthopædic centres, gymnasia, or clinics for the treatment of functional nerve disorders.

Poliomyelitis in all its Aspects. By JOHN RUHRÄH, M.D., and ERMIN E. MAYER, M.D. Pp. 297. New York : Lea and Febiger. $4 net.

THIS is an exhaustive treatise on Poliomyelitis. As the title claims, it deals with the disease " in all its aspects," and the full title is justified. Again, the authors are American and have had many opportunities of studying the disease in its many manifestations, for the disease is practically, in so far as epidemics are concerned, American and Scandinavian. There are 19 chapters in all and the 19th is specially interesting as giving a list of epidemics of poliomyelitis prior to 1911, collected from the report of the Health Department of the City of New York, up to 1908 (from 1841) from the article by Holt and Bartlett (*Am. Jour. Med. Sc.*, 1908, CXXXV., 647–662), and from 1908 to 1911 from Frauenthal and Manning (" Infantile Paralysis " 1914); the prevalence of poliomyelitis in the United States since 1910, compiled from the Reports of the United States Public Health Service; and poliomyelitis in 1916 in the United States, compiled from the Public Health Reports of the United States Public Health Service of June 1, 1917. The treatise is so full of interest that it seems invidious to pick out any one particular chapter or chapters. We propose to run the risk, however, by

drawing attention also to Chapter 2, dealing with a conception of the disease, and to Chapters 4 and 5, dealing with the nature of the virus and the epidemiology of the disease, as being specially worthy of the attention of readers into whose hands the treatise fortunately gets.

The 118 engravings and the 2 plates that accompany the book are noteworthy features, more especially the photographs of patients with various resultant paralyses of muscular or nerve areas, the protean character of such paralyses being tabulated on p. 98, to be read in conjunction with the further resultant deformities that will result from neglect, as tabulated on pp. 118-119.   The monkey is the only animal that may be satisfactorily inoculated at the present time with the disease, which is typical, though not quite identical, with that seen in human beings.   The incubation period in the experimental (monkey) disease is 2 to 42 days (average 2 to 14 days). The incubation period in the human being is usually short, generally under 8 days.   The germ that is the causal agent of the disease has not yet been discovered according to the authors of this treatise—not even the globoid bodies of Flexner and Noguchi satisfying them as such.   The authors are to be congratulated in having so clearly brought together in one single volume *all* that is known at present about the interesting disease of poliomyelitis.

Acute Poliomyelitis.   By George Draper, M.D., of New York City, U.S.A.
    Pp. 149.   London : William Heineman, Ltd.   7s. 6d. net.

We thought the last word—at least, for a time—had been said about acute poliomyelitis, when the official report of the Medical Officer of the Local Government Board (England and Wales) for the year 1916-17 was published, containing a special lengthy monograph on acute poliomyelitis by Dr. Bruce Low (*see* The Practitioner, September, 1917, pp. 264-5). Nevertheless, we welcome the issue of Dr. George Draper's book as dealing with the subject from the American professional standpoint, fresh from an epidemic " which swept over the Eastern United States during the past summer and autumn," exceeding in numbers of cases any previously recorded epidemic.   The mortality reached a maximum.   The preface is by Professor Simon Flexner of the Rockefeller Institute, who, in collaboration with Professor Noguchi of Japan, in 1914, succeeded in isolating an organism from the central nervous tissue of cases of poliomyelitis—the so-called " globoid bodies," which are regarded as the *causa causans* of the disease and which measure only 0·015 to 0·03 of a micron in diameter, occurring usually in pairs, small groups, or short chains, and staining best with Giemsa stain or with Gram.

Dr. Draper sets out to prove that " acute poliomyelitis is a general infectious disease, in the course of which paralysis is but an accidental and incidental occurrence."   He appears to us to have succeeded in the eleven chapters of which his book consists, dealing with the history of the disease, its ætiology, epidemiology, bacteriology, pathology, symptomatology, prognosis, and treatment.   The clinical studies, as set out in Chapters VI. to X., are fascinating, and will render diagnosis easy for those medical men who have had no personal experience of the disease, should they be called upon to deal with cases which may reach the British Isles and cause outbreaks, if not epidemics, under existing war conditions.   One of the synonyms of the disease is " infantile paralysis," but, in the opinion of Dr. Draper, this is a misnomer—dually so, the disease being limited neither to infants as regards incidence nor to paralysis as regards symptoms.

There is a useful table of references and an excellent index provided with the book.   Dr. Draper is to be congratulated.

Preparations, Inventions etc.

GLUCARSENOL.

(London : Modern Pharmacals, 48, Mortimer Street, W.1.)

This solution of novarsenobenzol (914) in glucose is prepared according to the formula of Dr. Balzer, and is contained in a combination of ampoule and syringe for intra-muscular injection. The solution is sterilized, and cannot be contaminated in any way. Glucose has been adopted as the vehicle after many experiments in place of water or oil. Being of thicker consistency than water, it is absorbed more slowly, but more certainly and more completely. It causes no pain, and the slow absorption lessens that due to the arsenobenzol. As it is a reducing agent, it prevents any oxidation. The complete preparation, called glucarsenol, contains 0·20 of novarsenobenzol, 0·10 each of guaiacol and stovaine, and solution of chemically pure crystallized glucose to 1·0 cc. The guaiacol and stovaine are added to make the injection perfectly painless, and this effect is promoted by the use of glucose in hypertonic solution. It is quite fluid, easily injected, and the needle, after use, is cleansed without difficulty in water. There is no danger of embolism, for the liquid does not coagulate the blood, but mixes perfectly with blood-serum. Glucarsenol is stable and keeps well.

It is put up in doses of 10, 15, 20, 25, and 30 cg. For use, the ampoule syringe is first placed in warm water to make the solution quite fluid, and shaken well. Each end is then snapped off cleanly at the marks, a flamed needle fitted on, and the glass piston introduced at the other end. It is recommended to give the injections into the lumbar muscles. The routine treatment adopted at the Hôpital St. Louis, at Paris, is two injections of 25 cg. for men each week, and from 10 to 15 cg. twice a week for women.

LEICESTER PUBLIC MEDICAL SERVICE.

This was inaugurated by the medical profession in Leicester on January 1, 1913, to enable dependants of insured persons to obtain medical attendance by means of small periodical payments. It is under the control of a board of management, and all the medical men in Leicester are associated with it in either an honorary or an acting capacity. There are consulting rooms at the central dispensary and at five of the eight branches. By arrangement with the Education Committee, accommodation is provided for the treatment of children : eyes, nose, ears, throat, and teeth.

A well-equipped hospital of 27 beds is available for medical and surgical cases at certain fixed charges for nursing and maintenance, patients being attended by their own doctor.

The board of management has in view further development of the work, and is further of opinion that the facilities offered by an organization which has proved both efficient and useful must be taken seriously into consideration by the local authorities when called upon to provide medical treatment for school children, dependants of insured persons, and others.

The fact that all the medical men in Leicester are associated with the institution is clear proof that a difficult matter has been met and dealt with satisfactorily. We congratulate the practitioners of Leicester on having evolved a scheme which, to all appearance, is well worth adoption in many parts of the country. *Concordia res parvæ crescunt.*

THE PRACTITIONER.

OCTOBER, 1918.

FRACTURES IN WARFARE.

By Sir ARBUTHNOT LANE, M.S., F.R.C.S., R.A.M.C.

Consulting Surgeon to Guy's Hospital, etc.

DURING the four years of the war no branch of surgery has more closely engaged the attention of the surgeon, or called for more skill and care on his part, than has the treatment of injuries involving the solution of continuity of bones. In considering the treatment of fractures, surgeons are somewhat inclined to confine their attention to such compound fractures as are produced by projectiles, forgetting that a large number of these injuries result from other incidents of warfare, such as mine explosions, aeroplane accidents, falls from horses, vehicles, over wire or into trenches, from blows, and in innumerable other ways. The fractures which occur in warfare may be conveniently classified under these headings :—

    1. Simple fractures.
    2. Compound fractures not produced by projectiles.
    3. Compound fractures produced by projectiles.

As regards simple fractures, this war's experience might lead the observer to conclude that few injuries have been treated so unsatisfactorily as these. This appears to be due either to a want of familiarity with the mechanics of fractures, or to such an imperfect operative technique as to suggest but little knowledge of the very important details which a surgeon should possess, when he is called upon to operate on fractured bones. In many instances the ends of the fragments had been mutilated, and the limb correspondingly shortened or deformed in attempts to facilitate the apposition of the fractured extremities and the restoration of the bone to its normal form. Sometimes the fragments were found to overlap, forming varying angles with each other; and at other times their axial relationships did not correspond, so that the lower fragment was abnormally rotated on its long axis upon the upper to an extent sufficient to produce considerable limitation of the function of the part. It not infrequently happened that the plate or plates employed were too frail or too short to hold the fragments securely in apposition, or they were improperly attached, or an insufficient number of screws were used.

Occasionally, after the operation had been performed very efficiently, the surgeon had not taken adequate precautions to keep the limb at rest. An abnormal strain was consequently exerted on the screws and in the junction, so that non-union or mal-union of

the fragments resulted, and the patient was left with an extremity impaired in its usefulness. The rule that should guide a surgeon in having recourse to operation in any particular case of fracture seems to be perfectly simple. If he is satisfied that he cannot, by manipulation under an anæsthetic, prolonged extension, etc., replace the broken fragments of a bone in a simple fracture in accurate apposition, and if he believes that failure to restore continuity of the fragments is likely to interfere with the wage-earning capacity of the individual or with the requisite usefulness of the limb to the patient, it is his duty to operate and to restore the bone to its original form and function. He is also under an obligation to his patient to equip himself so as to be in a position to carry out the details of such an operation efficiently and with safety to the patient. There must be no compromise in this particular.

Operations for disability resulting from non-union of fragments in a simple fracture, or from overlapping of fragments, or from union of the fragments so that their long axes do not correspond, are at times very difficult. This is particularly the case when the fracture is in the vicinity of important nerves, as, for instance, in that portion of the radius surrounded by the supinator nerves through which the branches of the musculo-spiral nerve pass to their terminal distribution. Fracture of the radius in this situation is by no means uncommon, and the result of treatment by splints and extension is often very unsatisfactory, since it is difficult to prevent overlapping and to avoid divergences in the axial rotation of fragments by any known method. When the fragments have finally united, operative interference is complicated by the necessity of having to divide the bone often in two places in a limited space in the immediate vicinity of nerves, damage to which would do much to detract from the benefit that would result from the perfect restoration of the bone to its normal form and function. To place the fragments in linear continuity is the least troublesome part of the operation as compared with restoring axial continuity, since the outline of the blended fragments becomes very considerably modified in the interval of time which has elapsed between the receipt of the injury and the operation.

Again, in old-standing fractures of the shaft of the radius at the junction of the upper three-fourths with the lower fourth, not only is there considerable difficulty in correcting the axial rotation of the lower fragment, but very great resistance is experienced in bringing out the lower fragment from its abnormal approximation to the ulna, which takes place because of the contraction of the soft parts between those bones. These operative difficulties are accentuated by the early and rapid wasting of the compact cancellous tissue of the lower fragment, rendering it very fragile and friable, and so soft that the grip of the screws, which are employed to secure the steel plate, is very insecure and transitory.

Owing to the teaching in the text-books, surgeons generally have a very incorrect idea of the length of time required for firm consolidation of the callus between the ends of recently fractured

bones. As a result of this, after the fragments have been secured in accurate apposition by means of plates and screws, the splint or other apparatus is frequently removed at too early a date, and the screws and plate and soft junction may yield to the excessive strain so that deformity and disability result.

In the case of fractured bones of old standing, in which an operation is performed for non-union or axial deformity, it is well to remember that the period required to ensure firm bony union between the coöpted fragments is very much longer than it is in operations performed for recent fractures. I have seen much disappointment result from want of knowledge of these conditions.

As regards compound fractures not produced by projectiles, the surgeon must obtain accurate apposition of the fragments, if he possibly can, by manipulation, traction, and splinting. In circumstances in which it is exceedingly unlikely that any infection has taken place, a plate may occasionally be employed with advantage. These fractures vary in character in their degree of infection, sometimes being hardly, if at all, more serious than simple fractures, while at other times they have associated with them all the risks of a compound fracture produced by a projectile. The commination is also very much less, as a rule. A foreign body is rarely embedded in the tissues about the fracture, and this causes much less anxiety.

In the case of compound fractures produced by projectiles, while it is most important to excise any damaged soft parts and to remove obviously useless fragments of bone at as early a date as possible, no special treatment of the bone is called for, other than extension sufficient to bring the fragments into apposition, etc. The importance of dealing with these injuries as soon as possible was thoroughly realized by that great surgeon, Baron Larrey. He devised a flying ambulance by which he was able to bring aid to the wounded within a very short period of the receipt of the injury. His results were little short of wonderful, and have not been excelled, even if they have been equalled, during this war. It took us three years to rediscover and apply his radical methods in the early treatment of wounds.

Owing to the presence of a wound, often of considerable size, in these compound fractures, there is a free exit for the effused blood and the inflammatory exudation which is poured out at a very early period. Consequently the soft parts, which form the ties in the length of the limb, are not shortened up to anything like the degree they are in simple fractures, and afford comparatively little resistance to the extension of the fragments on one another, so that overlapping of the broken ends is readily avoided if suitable means are adopted. The treatment of these fractures has been greatly facilitated by the methods devised by Major Sinclair and by the employment of X-ray apparatus at the bedside of the patient, allowing accurate observation of the results of treatment from time to time.

Here I must allude to the work of Professor Willems of Belgium, whose manner of dealing with wounds of joints has brought about one of the greatest advances in war surgery. We were in the habit of

keeping at rest the joints which were more or less severely damaged by projectiles, hoping to obtain in some few cases a movable joint but in the large majority being satisfied if a fixed joint in the best possible position resulted. He has demonstrated that by immediate voluntary movement it is possible to expect a movable joint in almost every case, even if it is necessary, when much of the articular surface has been removed, to secure the joint temporarily or permanently by some external support. The joint is freely incised if necessary, the apertures for drainage being closed when the secretion becomes sufficiently scanty. Irrigation by antiseptic solution is not employed. The frequent voluntary movement of the joint forms the very effective means for evacuating its contents and for bringing recently effused white corpuscles to bear on any organisms which may be present in the wound. I have seen many limbs rendered useless by excessive removal of fragments of bones, especially in comminuted fractures of the elbow and ankle-joint.

Early in the war, excisions of the elbow joint were frequent, but later it was realized that an elbow joint fixed at a useful angle afforded a more efficient and useful arm. Still later the method of early voluntary movement, suggested by Willems, has given incomparably better results, since a freely mobile joint is not uncommonly obtained in conditions where previously such results could not have been hoped for.

Operations for the restoration of very deformed bones to their normal form and function are often very extensive and tedious, and not infrequently make a great demand on the skill and resourcefulness of the surgeon. If a surgeon fails to succeed, occasionally, in an operation on a simple fracture, either recent or of old standing, in which the conditions are relatively simple, it is easy to understand that in the much more complicated state of things which exists in a deformed and useless bone resulting from a bullet or shell wound, he will have a correspondingly large proportion of failures to avoid sepsis. I have noticed that these accidents occur with much less frequency in the practice of those operators who are familiar with the special technique and precautions which these operations call for. At the same time one has to bear in mind the danger that exists from the presence of residual organisms embedded in the tissues, and every precaution must be taken against their existence, either by early free excision of damaged soft parts or by shortening the period of suppuration in the wounds.

Before any operation on a deformed or disabled bone is undertaken, every possible means should be employed to determine the existence of buried organisms. Very vigorous massage of the part, exercise as violent and prolonged as the patient can stand, the congestion of the affected part by a rubber band, and the use of multiple vaccines or of the original organism if its nature is known, all furnish effective means of obtaining a reaction should organisms be present in the tissues. In this manner it is usually possible to reduce to a minimum the risk of operating on a case containing living germs. Should any reaction occur, the above procedures can be employed to stimulate the

tissues to destroy the organisms. The importance of these precautionary measures is only too obvious to the surgeon who is frequently called upon to perform operations on such deformed bones.

If any infection should arise after such an operation, early drainage, disinfection, and prompt vaccine treatment will usually save the situation. In a certain proportion of cases, it will not be necessary to remove the plate, or its removal may be postponed till the fragments have united.

Grafts of bone are often very useful to fill up large gaps in a long bone or to secure the union of fragments when they have not united to one another. This is particularly the case in fractures of the tibia, the radius, the ulna, and the lower jaw, where large areas of bone have been removed by a projectile. After fixing the fragments of the tibia securely by means of a large plate and screws, a considerable proportion of the anterior portion of the sectional area of one of the fragments of the shaft can be removed with perfect accuracy by means of a saw, a carpenter's chisel and a mallet. It can be filled into the vacant space and secured in position by small plates by wire or by screws made out of the tibia. When a portion of the radius or ulna has to be replaced, the tibia usually affords the best source from which a graft can be obtained. In cutting the graft for this purpose it is well to carry the section sufficiently deep so as to include the cancellous tissue of the shaft in the graft. Occasionally a rib will supply a fragment of suitable length and thickness.

In replacing a portion of the lower jaw after the fragments have been immobilized by a suitable interdental splint, the gap may be supplied from the crest of the tibia or rib. Umbrella wire may be used to retain the fragments securely in position. At the Queen's Hospital, Sidcup, where the greater proportion of these cases are treated, some of the surgeons, in order to secure the graft, employ with success screws made from a portion of the tibia; while others prefer to shape the fragments and grafts so that the latter, by interlocking between the end of the jaw, remains in position without any metal or bone medium. Time will show which method affords the greatest advantage in varying conditions.

The most striking aspect of the introduction of grafts of bones to replace portions of the lower jaw is the early stage at which such an operation can be performed without fear of infection and of necrosis of the graft. Even if some suppuration ensues, it does not follow that the graft will necessarily necrose. This would suggest that the vitality of the tissues of the face is distinctly greater than that of the trunk or extremities. Costal cartilage affords a very useful material to replace loss of substance of the vault of the skull or of the malar bone, or to construct a framework for a new nose or to make a foundation for an artificial eye. It lives much more readily than bone, and is handled with greater facility.

CONCLUSIONS.

The conclusions that may be arrived at as to the operative treatment

of fractures produced by projectiles are :—

1. That only in very exceptional circumstances is it advisable to fix fragments of broken bones together by means of plates and screws whilst the wound is foul.

2. That if, for certain reasons, such a procedure is deemed necessary, screws should not be inserted near the broken extremities, but as far from the seat of fracture as possible.

3. That it is advisable to postpone operative interference till the wounds have healed for some considerable time and until the tissues are, in all probability, free of organisms. This can usually be determined with reasonable certainty.

4. That if any apparently septic focus is observed during an operation, a culture and a vaccine should be obtained from it, and employed at once should symptoms of infection of the wound develop.

5. That, should there be any definite suspicion of the presence of latent sepsis, irrigation by Carrel's or similar method must be adopted at once. If not, the wound should be closed completely at the time of operation.

6. That every attempt should be made to avoid any shortening of the limb, or to reduce it to a minimum.

7. That the apposition of the whole areas of the broken ends is not necessary, since the interval will fill up subsequently by bone if suitable means are adopted. Fragments of bone or callus should be saved and employed to fill any interval between the pieces of the shaft.

8. That much heavier steel plates are required in this class of case than are usually employed in the less comminuted fractures of civil life. It is most important that the muscles and joints, which are in relation with the fractured bone, shall be moved voluntarily by the patient as soon as possible after the operation, in order to avoid that stiffness and limitation of movement that so often complicate these fractures. This is especially the case in the joints of the knee, ankle, and foot. In order to obviate this trouble, without risking the security of the junction, the plates which are employed to retain the fragments in position must be as long and as strong as circumstances will permit. They should be secured by as many screws as possible. The plates that are often employed are quite inadequate for the purpose. It is obvious that such early treatment cannot be adopted when the fragments are very fragile and the grip of the plate and screws insecure.

9. That providing no strain shall be exerted on the junction likely to develop non-union, the sooner the patient who has been operated on for fracture of one or more long bones of the leg is got up and about, the more bone will be deposited and the more rapid will be the repair at the seat of fracture.

For this purpose a good ambulatory splint is a necessity in certain cases.

10. That, should the interval between the fragments be so considerable that union is not likely to take place, even after prolonged congestion, brought about by the use of an ambulatory splint, the fragments should be secured in perfect alignment by a plate fixed vertically behind the centre of the shaft. When this has been done a portion of one of the fragments, which is usually equal in thickness to a third of the total circumference of the shaft, can be sawn and chiselled off and secured over the interval between the fragments, any piece of bone removed to accommodate the graft in the other fragment being fitted to occupy such existing interval as may be left between the bones. If enough material cannot be obtained from the fractured bone to make a graft, it must be got from some other bone.

11. That most of the failures of bone grafting for extensive loss of substance are due to the surgeon depending on the unsatisfactory grip which the graft alone can be made to exert upon the fragments of the shaft. The essence of success depends on the absolute immobilization of the fragments of the shaft on one another, and of the graft upon those fragments. It is obviously ridiculous to attempt to retain the fragments of bone in a useful position by bone grafts alone in these compound fractures produced by projectiles, as it is in any fracture in which the material securing the fragments in position has to bear considerable strain. In grafting bone into gaps in the lower jaw, fixation is supplemented by interdental splints which lock the jaws.

12. That much has been written about wire screws and plates acting as foreign bodies if used in simple fractures, and producing a rarefying ostitis around them. Should such rarefying ostitis exist, it is undeniable evidence that the technique of the operator is faulty and not the procedure. The remedy is in the hands of the surgeon, who must improve his methods. Frequent failures in unskilled hands have led many to attribute their want of success to the employment of steel plates and screws, and to attempt to avoid sepsis by using other and much less effective means.

13. That while the operative treatment of compound fractures produced by projectiles is the most important of all surgical procedures in warfare, it is, perhaps, well to remember that it may demand a degree of asepsis, mechanical skill, resource and judgement in excess of that required for other operations for war conditions.

14. That, besides that of sepsis, usually introduced from without though occasionally developed from a latent infection, hæmorrhage is the chief risk which is associated with these

operations. This can be best avoided by the use of very powerful hæmostatic forceps, which are left in position in the wound for as long as possible during the course of the operation. A ligature is rarely required. It is most important that the wound should be left as dry as possible. When much oozing is expected to follow the operation, a long drainage tube may be left in the wound for twenty-four hours, and so arranged that the extravasated blood may be carried free of the dressings. The removal of the tube does not necessitate any change of dressings, for they are not moistened by the blood.

The relative value of security to convenience has not received the attention it merits, if one can judge by the routine methods which have been adopted in this war. The importance of this can be best illustrated by examples.

For instance, in civilization in town life the possession of a stiff knee-joint, producing a rigid lower extremity, is a constant source of annoyance to the individual and a recurring cause of inconvenience to other members of the community. Such a person can only conveniently occupy certain limited accommodation in a theatre, while his very presence is resented in any public vehicle in which the thoroughfare is limited, as it almost always is.

In innumerable different ways a rigid leg unfits a man for leading with comfort the ordinary life of a town dweller, since the conditions which exist are built up on the supposition that everyone shall be capable of bending the knees. Again, the individual with a rigid lower limb has to occupy such a constrained position when sitting down that an abnormal strain is experienced by the joints and muscles of the lumbar spine and pelvis, and weariness and discomfort result after a very short time. The inconvenience entailed by a rigid leg can be best illustrated by a cutting from the letter of such a sufferer, who has since had his leg amputated because he could no longer put up with the inconvenience of it :—

" For the last four months I have been walking on the stiff leg, which I have found a great hindrance. The only way in which I can sit with any comfort is by placing the leg upon a chair, and this can only be done when at home. In public buildings it is impossible to sit with comfort; while the leg, sticking out straight, is not only a nuisance to myself but to those around or near me. This is to be experienced more in theatres and public places, where the limb becomes a source of annoyance to those who wish to pass by me. Unless the rows of seats are fairly well apart, it is impossible to sit in some theatres. I experience the greatest trouble in travelling, especially about London. The only way I can sit in a bus or train is to balance myself on the edge of the seat—a most uncomfortable position—and to bring the foot to the floor. If I fail to do this, my foot must rest on the lap of the person

opposite. When I bring the foot to the floor, the limb usually stretches across the compartment, so that it becomes necessary to rise every time anyone wishes to pass. When the vehicle is full it is almost impossible to sit down, as I cannot keep the leg out of the way of the people who are standing. I have also experienced difficulty in bed, as I cannot get the leg into a comfortable position, and my nights are consequently very restless."

In considering the measures that should be adopted in severe wounds about the knee-joint when much bone has been carried away, the surgeon is apt to argue that if he cannot obtain bony ankylosis between the femur and tibia he should amputate the limb, in the belief that an artificial limb will afford his patient the best mode of progression. A rigid limb gives the possessor security at the cost of convenience.

If the patient has a leg which permits of free movement of the tibia on the femur around a transverse axis, in other words, what is commonly described as a flail joint, he can, by wearing an external support, transmit his weight from the pelvis and thigh to the boot. The presence of a ring catch joint enables him to flex his leg in the situation of the knee joint with great facility and rapidity, while the moment the erect posture is assumed the joint locks and the limb becomes for all practical purposes a rigid one. In such a limb security is sacrificed to convenience. This man cannot do the same amount of heavy work that one with a rigid leg can do, but he is more fitted to lead a conventional town life with comfort to himself and with convenience to his fellows.

In dealing with these injuries the surgeon should, therefore, be influenced by the circumstances of the patient in deciding as to the relative advantages of security and convenience in each individual case. Again, while assuming that a rigid limb is much more useful to the labourer than is any form of artificial limb for an amputation through the thigh, the relative merits of a flail limb and of an artificial leg call for our careful consideration.

Apart from the sentimental value which appertains to the possession of one's own leg, inquiry made among a large number of those who have sustained an amputation through the thigh showed that while a good many continued to wear their artificial limbs with comfort and satisfaction, quite a considerable proportion discarded them altogether, or wore them only for intervals of time, or on occasions. Many of them realized that an amputation entailed many subsequent discomforts and disadvantages that surgeons generally were not familiar with, but which are very real to the possessor of the stump.

There is a very great deal to be said for the advantages which the flail joint in the leg affords. While it is the undisputed intention of the surgeon to obtain a rigid limb if the knee joint has to be lost, and that failing it an amputation through the thigh should be performed, it would appear that in a large proportion of the com-

munity the individual is better off with a flail joint suitably supported by an apparatus than with a rigid limb or with an artificial limb.

This is merely an example of the rule " that which is universally accepted as true is always false." The same applies in a lesser degree to the shoulder joint. A humerus ankylosed to the scapula at a suitable angle affords security at the cost of convenience. A humerus moving freely on the scapula affords convenience at the cost of security. For this reason, the patient's habits and circumstances should be considered carefully, before any operation is performed for destruction of the parts about the shoulder joint by projectiles.

On comparing the relative advantages of a stiff shoulder with those of a flail joint, inquiries have shown that while the former gives security the latter affords convenience. The disadvantage of the flail joint is that the process of education of the muscles and the development of a new false joint is very much more tedious than the convalescence of a humerus ankylosed to the scapula, but the general opinion of patients whose life was not a laborious one preponderated largely in favour of the flail joint. They found it more convenient, and every month added to its security and usefulness.

Another injury which is by no means uncommon is that of a compound comminuted fracture of the lower end of the shaft of the humerus not involving the elbow joint from which fragments of bone of some size may have been removed.

In spite of extension in various places the lower end of the humerus tends to become abruptly flexed at the elbow joint, and the end of the shaft comes into relationship with its posterior surface. When the wound has healed there is very often not a sufficient length of lower fragment to permit of its being secured to the shaft by means of a plate. Besides it is usually difficult and sometimes impossible after a considerable interval of time to extend the elbow joint so that the lower fragment shall form a right angle with the ulna and radius. Consequently, any attempt to secure the fragments by plate or wire exposes the junction to a strain which is usually excessive. As the movements of pronation and supination are performed perfectly in the normal elbow joint, and it is impossible to obtain that of flexion and extension in the elbow joint, it would seem advisable to develop a false joint between the humeral fragments which will permit of movement around a transverse axis. Such a joint improves in its functional capacity steadily, if suitable exercises are performed with the object of perfecting it.

MEDICAL NOTES.

By Sir THOMAS HORDER, M.D., F.R.C.P,

Assistant Physician to St. Bartholomew's Hospital, etc.

ON CARDIAC BRUITS.

(21) Of any cardiac bruit, the observer should carefully note and record :—

- (i) Its *time ;* whether systolic, diastolic (*i.e.*, early diastolic), or præsystolic (*i.e.*, late diastolic).
- (ii) The *place* where it is best heard ; whether apex, aortic base, pulmonary base, or elsewhere.
- (iii) The direction and extent of its *conduction*.
- (iv) The *total area* over which it can be heard.
- (v) Its *constancy* or *inconstancy* in regard to the posture of the patient, and the respiratory rhythm.
- (vi) Its *acoustic* characters ; whether loud, faint, musical, crescendo, etc.

Being expressed as an adjective, (vi) is for convenience put first in the description of the murmur, though it is a feature of far less importance than (i) to (v). *Example :* The typical bruit of mitral regurgitation is a soft blowing systolic murmur, heard best at the apex-beat and conducted towards the axilla ; it is heard over a considerable area of the chest wall and at the angle of the left scapula ; it is constant with posture and respiration.

(22) In " timing " any event in the heart-cycle during ordinary clinical examination, it is well for the beginner to remember that systole of the ventricles, the first sound of the heart, and the impulse, are synchronous events. It therefore follows that a bruit can often be " timed " best by simultaneous palpation and auscultation.

(23) The existence of cardiac bruits having little or no importance has been known for many years, and careful teachers have always warned their students against arriving at any conclusion with regard to a patient's heart from the mere discovery of a murmur over it. We are now told that too much importance is attached to murmurs in general. This is scarcely possible, for the detection of a bruit over the heart is a matter of primary importance. The point that should be emphasized is that a bruit needs careful analysis before its significance can be appreciated, and that even then it is only one of several data that are necessary before an opinion can properly be given as

to the integrity of a patient's heart.

(24) For all that may be said concerning the unimportance of cardiac bruits in the presence of good cardiac muscle, as judged by all possible investigations, the fact remains that a systolic bruit heard in the region of the apex, conducted towards the axilla, and unaffected by posture and respiration, is *in practice* taken to mean that the heart producing it must not be trusted to stand prolonged or excessive effort, and is likely to fail under strain. If experience dictates this practice, we need not heed the doctrine that " mitral regurgitation, even from a damaged valve, is seldom, if ever, of much importance." For the practical decision admits—what should never have been forgotten—that the circulation is based upon principles of hydraulics.

(25) The characters of " functional " or " hæmic " murmurs are, in the main, as follows : they are systolic in time ; they are much more common at the base than at the apex, and at the pulmonary base than at the aortic base ; they usually lack conduction ; they are generally louder in the recumbent than in the erect posture, and may only be heard in the recumbent posture ; they are frequently affected by respiratory movement.

(26) The first thing to say (to oneself) about a systolic bruit heard at the aortic base is that the case is probably not one of aortic stenosis. More likely causes of the bruit are the following : atheroma of the base of the aorta, anæmia (and other general conditions associated with " functional " bruits), mitral regurgitation, and aneurysm of the ascending part of the arch of the aorta. But if, in addition to the presence of a systolic aortic bruit, the following features are also made out during the examination : good conduction of the murmur towards the right side of the neck, considerable hypertrophy of the left ventricle, systolic thrill in the second right costal interspace and a small pulse ; it may be said with confidence that the patient suffers from aortic stenosis.

(27) The diagnosis of Tricuspid Regurgitation is assisted very little by its characteristic bruit—a blowing systolic murmur heard best in the region of the xiphoid cartilage. The diagnosis is much more often made by observing that the right heart is enlarged, that the veins in the neck are full and pulsating, that the liver and kidneys are congested and that there is œdema of the legs. All these things may be present without any bruit, or without any bruit that can with certainty be attributed to tricuspid regurgitation rather than to the mitral regurgitation which is usually also present. No doubt the reason of this is that the systolic force of the right ventricle, never very strong, is diminished owing to the state of general cardiac failure ; the regurgitant stream through the tricuspid orifice therefore produces no audible eddy.

(28) The statement is frequently made that ulcerative endocarditis

may exist in the absence of cardiac bruit. The statement is correct, but it makes an appeal to the mind of the reader that is disproportionate to the importance of the fact. The statement should be balanced by the additional information that this state of things is only likely to be present in very acute primary cases of the disease, or when the condition is a terminal infection—in both of which instances there is, as a rule, a considerable degree of heart failure from the first.

(29) Another attractive statement often made in accounts of ulcerative endocarditis, and needing some qualification, is that in this disease the murmurs are apt to " change from day to day." If this means that fresh bruits are prone to appear as the disease progresses, the words form a somewhat loose statement of fact. But if the words are read literally, then it should also be added (i) that the mere change in the character of a bruit from day to day in a case of acute endocarditis by no means implies that the endocarditis is of the ulcerating type, not even when the bruit disappears and re-appears; and (ii) that in ulcerative endocarditis the bruit or bruits may be extraordinarily constant.

(30) Two auscultatory signs give valuable indications of approaching failure of the " renal heart " (hypertrophy of the left ventricle in chronic nephritis) : (i) *bruit de galop*, or reduplicated first sound, and (ii) a soft systolic bruit in the region of the apex-beat. The appearance of either of these signs in a heart, examination of which has not hitherto revealed it, should be regarded as ushering in a state of dilatation of the left ventricle. These signs frequently disappear with appropriate treatment, often to re-appear later, when the limit of response to treatment is being reached.

(To be continued in the December issue of THE PRACTITIONER.*)*

RECENT PROGRESS IN GYNÆCOLOGY.

By FREDERICK McCANN, M.D., F.R.C.S.

Surgeon to the Samaritan Free Hospital for Women, London.

THE DUCTLESS GLANDS AND THEIR RELATION TO GYNÆCOLOGY.

FOR those who would understand aright and intelligently treat many obscure female ailments, a knowledge of the action and interaction of the ductless glands is essential. Bandler (*American Journal of Obstetrics*, October, 1917, p. 644) gives an interesting account of the interaction of the different ductless glands. He inclines to the view that the posterior lobe of the hypophysis is intimately related to menstruation. The ovaries, corpus luteum, and posterior lobe of the hypophysis (pituitary body) have trophic control over the well-being of the uterus and adnexæ.

The uterine mucosa swells each month into the menstrual decidua, producing a secretion which reacts on the ovary. Ovarian secretion and the corpus luteum react upon the decidua. During menstruation blood is expelled, and a stimulus by the posterior lobe of the pituitary is supposed to be exerted. " In all probability many cases of excessive pain and uterine contractions during menstruation, resulting in dysmenorrhœa, are due to excessive activity of the posterior lobe at these menstrual epochs, aided by the action of corpus luteum." " When we realize the influence of the ovarian secretion and the corpus luteum, with its tendency to dilate the cerebral vessels, when we take into consideration the swelling of the thyroid with a probability of hyperthyroidism being present in many cases, when we consider that changes take place in the hypophysis gland, particularly the posterior lobe, at menstruation, we may realize how a sensitive or unstable relation of these three glands may cause patients to suffer for the few days before each menstruation, and this, apart from the distress of dysmenorrhœa."

Menstruation is a miniature labour; labour, a magnified menstruation. At full term, the ovary and the pituitary extract act again as they do during menstruation, after that function has been inhibited for 280 days by the presence in the uterus of the placental gland.

At the menopause there is a retrogression of the ovarian function, with a coincident alteration, in normal cases, on the part of the thyroid and hypophysis.

Since the co-ordinated interaction between the glands is often upset at the menopause, an explanation is furnished for the nervous phenomena associated with menstrual cessation. The thyroid and the hypophysis reacting normally would appear to be essential to a

normal stable nervous system and normal cerebral activity.

It seems to be forgotten that a woman gets on very well without ovaries when the interglandular balance has been adjusted, although, previous to this adjustment, various " functional disturbances " may exist.

Ovarian instability or hypofunction may be primary, but in many instances its relation to the thymus, thyroid, and hypophysis is so close that the result is secondary. Altered ovarian function, as evidenced by menstruation, is an indication that there is a disturbance of glandular interaction. The thymus and the thyroid influence the growth of bone. In diminished function of the thymus the bones are shorter, thinner, and more fragile. Early retrogresssion of the thymus results in large hyperplastic ovaries, whilst hypoplastic ovaries may indicate a persistent thymus.

Infantile uterus, hypoplasia of the uterus and adnexæ, poorly developed secondary sex characteristics, late menstruation, are evidence either of primary involvement of the ovaries and genitalia, or a secondary influence exerted upon them by the thyroid, hypophysis, adrenals, thymus, or other glands. The primary condition should be determined, and ovarian extract and corpus luteum always administered, and, where necessary, thyroid or hypophysis added.

Amenorrhœa of lactation, associated with lactation atrophy (superinvolution), is due to the influence of the mammary gland secretion. The mammary gland, under the stimulus of suckling, elaborates the hormone, which contracts the uterus and antagonizes corpus luteum, and excessive action of this type, associated with amenorrhœa, eventually results in atrophy of the uterus and inhibition of ovarian function. In the majority of cases, this condition can be combated by the administration of ovarian extract or corpus luteum with the addition of iron, arsenic, and thyroid.

Bandler explains the absence of menstruation and atrophic changes in the uterus, which occasionally follow " a too thorough curettage," by the absence of stimulation of the ovaries from the endometrium, and especially where there is an " underfunction " of the posterior lobe of the pituitary gland. This occasional disastrous result of what is termed " thorough curettage " should be ever present to the minds of those who have not yet developed the deftness of the skilled craftsman.

Bandler recommends thymus for the persistent menorrhagia of young girls, and for uterine hæmorrhage associated with fibrosis uteri. For the latter the thymus is combined with ergot or ergotine. Thymus is used because of its antagonism to ovarian secretion.

Recently, placental extract has been suggested for menorrhagia and metrorrhagia. When pregnancy occurs, there is a combined antagonism between the pituitary, ovary, and adrenals on the one side and the placenta on the other. On theoretical grounds, the employment of placental extract would seem to be indicated. The preparations made from the ductless glands should not be used to the exclusion of other remedies, but are useful adjuncts to those drugs

which have already proved their value.

This subject is discussed by E. C. Cutler and J. J. Morton in the December (1917) number of *Surgery, Gynæcology, and Obstetrics*, p. 621. Sixty-five post-operative pulmonary complications were encountered in a series of 3,490 cases.

According to these authors, the factors predisposing to post-operative pulmonary complications are—

1. Poor general condition, *i.e.*, age, anæmia, alcoholism, arteriosclerosis, weak heart or susceptible lungs.
2. Oral sepsis, *i.e.*, teeth carious, necrotic, etc., tonsils septic.
3. Pre-existing lung pathology, not only tuberculosis but bronchitis, emphysema, or a recently subsided pneumonia.
4. Anæsthetic badly given, *i.e.*, forced aspiration of mucus permitted, unnecessary intubation of naso-pharynx, vomiting on table, etc.
5. The presence of septic foci.
6. Too radical operations that open up unnecessarily pathways to the neighbourhood of the lungs or to the lungs themselves.
7. Operations in the epigastrium carry the added danger of lung complication through ease of vascular and lymphatic extension.
8. Exposure to cooling fluids or to draughts (vaso-motor disturbance).
9. Post-operative pain resulting in hypostasis from poor expansion.

PROPHYLACTIC MEASURES.

1. Careful preparation of the mouth; all oral sepsis from teeth and tonsils eradicated, antiseptic mouth wash and extra careful brushing of the teeth the day of operation.   Turner (*Proc. Royal Soc. Med.*, 1912–1913, Odontological Sect., p. 70) recommends mechanical scrubbing of the mouth with citric acid.

2. Observation of patient for at least two days before operation to insure absence of lung pathology and septic foci.

3. Carefully administered anæsthesia, preferably in the hands of an expert; ether to be given by the drop method.   Avoidance of mechanical appliances in mouth and nose unless indicated.   Surgeon to be ready to operate when patient is prepared.

4. Avoidance of exposure during preparation on the table, no unnecessary wetting, plenty of blankets.   Again after operation, particular care to avoid exposure, plenty of blankets, and if the patient is recumbent these to be pinned about the neck.   Operating room temperature kept above 75° F.   The liberal use of hot wet packs in laparotomies in walling off the operative field.

5. Avoidance of trauma, especially in the epigastrium and in the neighbourhood of large vessels.

6. Asepsis.

The authors further advocate movement in bed and getting the

patient up and out of bed as soon as is compatible with the existing conditions in each case.

A valuable suggestion is made in this paper concerning the desirability of keeping anæsthesia charts. The anæsthesia record is made by the anæsthetist, and the post-operative by the nurse. In the latter the following points are noted :—1. Conscious at ——. 2. Nausea; 3. Vomiting; 4. Headache; 5. Cough; and 6. Thirst. Such records should be in existence in all properly equipped hospitals.

POST-OPERATIVE THROMBOSIS AND EMBOLISM.

Sudden deaths from pulmonary embolism still go to swell the post-operative death-rate. The cause closely linked with that of thrombosis is variously ascribed to the blood being infected with bacteria, to the recumbent posture, to the anatomical situation of the affected vein, and, lastly, to the quality of the blood.

The writer, in a paper published in the *British Medical Journal*, May, 1918, inclines to the view that although these may be contributing or predisposing causes, the fault lies in some error of technique.

Post-operative embolism occurs in the practice of surgeons, good, bad, and indifferent, in every country, after " clean and unclean cases," after short operations and long operations, after easy operations or after those attended with complications whether performed on the young or on the aged. There must be some common error in the practice of operative surgery to account for these fatalities, otherwise their number would ere now have been reduced to vanishing point. Improvement in surgical technique, especially in the direction of combating sepsis, has helped to reduce the number of cases of post-operative thrombosis and embolism. Who can be sure that complete asepsis has been attained during an operation or the subsequent convalescence ? It is assumed when all goes well, but it is not proven. Indeed, it is much more difficult to exclude the septic element in any consideration of this subject than many writers would have us believe.

Statistics furnished from the Mayo Clinic show that 5 per cent. of the·total number of deaths from all causes are due to embolism. Operations on the gall-bladder and on the female genitalia furnish the largest number of deaths—0·19 per cent. and 0·13 per cent. respectively. The nature of the tissues involved is given as the explanation of the greater frequency after gynæcological operations.

I believe the chief fault in technique is the employment of *transfixion.*

Never transfix a vascular area should become a surgical axiom. By transfixion, vessels are liable to be punctured, and bleed either externally or into the tissues; the transfixing ligature is tied to arrest the bleeding, and the result may be that the ligature remains in the lumen of the vessels. Now, if this ligature is of doubtful asepticity or becomes subsequently infected, the natural process of clotting in the vessel may be arrested, the clot liquefying and becoming detached in portions or in its entirety. The necessity for avoiding transfixion or puncture of blood vessels in the broad ligaments, omentum,

mesentery, gastric and intestinal walls is considered, and the following suggestions are made concerning the surgical technique :—

1. Operate anatomically, picking up vessels cleanly and ligaturing them without encompassing masses of tissue.
2. Do not transfix or puncture blood vessels.
3. Do not tie or stitch too tightly.
4. Obtain accurate hæmostasis, leaving no blood clots.

TISSUE-TONE.

In the *American Journal of Obstetrics*, 1917, Vol. LXXV., p. 545, Huggins directs attention to the fact that there is at present no means of determining what he calls the " horse-power " of the patient to be subjected to operation. Apart from such obvious contra-indications as damaged kidneys, lungs or definite cardiac disease, there is a condition which is characterized by poor tone throughout the entire muscular system, including the heart, which is most difficult to measure. Careful study suggests a flabby heart. If this condition of flabbiness seems present throughout the body, it is of great prognostic importance. The condition may best be described as one of chronic fatigue, and the strain of a major operation may be more than the patient can stand. Many causes operate to bring on this condition of reduced vitality, which is an important factor often overlooked. Suitable rest and building up of the patient, perhaps for several weeks before operation, may make the difference between recovery and death to the patient.

Huggins considers the reaction of the heart to graduated exercise as indicated by the change in pulse-pressure to be a valuable indication. If exercise diminishes the pulse-pressure markedly, operation is unsafe or distinctly contra-indicated. A functional kidney test should not be neglected, whilst the electro-cardiogram may reveal suspected disease. Loss of tissue-tone and flabby heart-muscle with prolapse of the uterus is another danger signal. It is particularly true when the prolapse develops suddenly, the patient seeking relief a few weeks from its onset. The predisposing factors following the trauma of childbirth have been present for years, but suddenly, for no well defined reason, the uterus becomes prolapsed to the second or third degree. Huggins reports three deaths following operation for relief of uterine prolapse. As there are no necropsy reports, the evidence remains defective.

The paper, however, is a plea for a more careful study of the patient's general condition before undertaking a major operation and an attempt to improve the condition by rest and general building-up. If the patient does not respond to this treatment, the advisability of operation becomes doubtful.

FAT-EMBOLISM AS A CAUSE OF POST-OPERATIVE DEATH.

In *Surgery, Gynæcology and Obstetrics*, 1917, Vol. XXV., No. 1, an important contribution has been made by Bissell on the subject of

fat-embolism. His conclusions are as follows :—

1. Deaths clinically supposed to be due to surgical shock are due, in so far as this experience goes, to pulmonary fat-embolism and its attendant blood-pressure phenomena.
2. Pulmonary fat-embolism causes a lowering of arterial blood-pressure and an elevation of venous blood-pressure, which may be sufficient to cause death.
3. Intravenous infusions are contra-indicated because of the increased pressure on the right heart.
4. By simple methods pulmonary fat-embolism is easily demonstrated at the necropsy.

Six examples of fatal post-operative fat-embolism were observed in the Mayo Clinic. Three followed breast amputation, one ventral herniotomy, one craniotomy for brain tumour, one laminectomy for spinal cord tumour.

Fat-embolism in the obese or after operations in fatty tissue with considerable trauma is a very serious danger, for it sometimes causes death. The susceptibility of the obese to shock has long been recognized ; indeed, Roswell Park years ago arrived at the following conclusions :—

1. Fat-embolism in varying degrees of severity is not an uncommon complication of surgical accidents and operations.
2. It may be so mild as to be lost sight of in the general condition of shock ; or, perhaps, more properly speaking, it is one factor of a condition of prolonged shock.
3. Our knowledge of the subject will be greatly increased when we appreciate the possibility of its occurrence and observe our cases more closely, watching for the appearance of fat in the urine or slight dyspnœa, etc.
4. When prostration and loss of blood have been great, a moderate amount of embolic disturbance of this kind may turn the scales against a patient who would have otherwise recovered.
5. By a proper understanding of this subject, certain deaths may be explained which otherwise seem inexplicable.
6. Treatment can be only symptomatic, but may accomplish something.
7. Autopsies should be so conducted as to reveal this condition when present.

REVIEW OF TROPICAL DISEASES.

By R. TANNER HEWLETT, M.D., F.R.C.P.

*Professor of Bacteriology in the University of London ; Lecturer in the
London School of Tropical Medicine : Physician to King George V.
Hospital.*

MALARIA.

PEPPER [1] gives an interesting analysis of 50 cases of malaria admitted
into the University of Pennsylvania Hospital. In 49 cases the
parasite was the benign tertian, in 11 cases the sub-tertian. Nine
of the cases had no demonstrable enlargement of the spleen. The
blood-findings were very variable; only 8 cases had hæmoglobin
below 50 per cent., and 14 had readings of above 80 per cent. In
only 4 cases was the reading very low (20, 26, 29, and 30 per cent.),
and of these there was but one with a red cell count of less than
2,000,000. The colour-index was therefore well below one in each
of these cases. These 4 very anæmic cases did not by any means
represent the most severe nor the most prolonged infections; 2 were
infected with the sub-tertian parasite and 2 with the benign tertian.
On the other hand, the cases with a high hæmoglobin reading included
some instances of prolonged infection and 2 cases of the sub-tertian
type. Apart from the changes characteristic of anæmia the erythrocytes
exhibited nothing peculiar, and nucleated red cells were but seldom
seen.

The highest count of white blood-cells was 12,200 per cmm., and
only six counts of 10,000 or over were recorded. On the other hand,
4,000 was the lowest count, and there were only six counts below
5,000. The accepted teaching is that there occurs in malaria a slight
diminution in the total leucocyte count and an actual increase of
large mononuclear cells. In this series the mononuclear cells ran
on the average a little high, and in 1 case 35 per cent. of these cells
was present and in 2 cases 18 per cent. The presence of granules
of malarial pigment within the cytoplasm of the large mononuclea
cells, as has been described, was not observed; 1 or 2 per cent. of
eosinophiles was quite constantly noted.

In several patients, in whom the history and clinical appearance
did not strongly suggest malaria, the finding of a mononucleosis
encouraged further search for parasites with ultimate success. In
every case the temperature promptly became normal once vigorous
treatment with quinine was instituted, and the patients were all
discharged without fever, without organisms in the peripheral blood,
and apparently in good condition. Only 1 case returned in a relapse,
but as the majority of the cases were in sailors, many of whom left
port soon after discharge, it is impossible to draw conclusions as to

the permanent efficacy of the treatment.

In 1914, Stephens gave an account of a case of malaria showing anomalous parasites. These he believed to be a new species to which he gave the name *Plasmodium tenue*. Other papers have since appeared dealing with this subject, and the general opinion appears to be that this parasite is not a new species, but is an atypical form of the sub-tertian parasite. Cragg and Naidu [2] have met with a case showing this form of parasite. The patient was a Turkish prisoner, and a first blood film examined showed a heavy infection with malaria parasites. The infection seemed to be a sub-tertian one, with here and there a benign tertian parasite. While some of the parasites showed the usual regular small-ringed forms of the sub-tertian parasite, a large proportion was irregular, showing large and small ovoid forms and forms with long processes, recalling the figures depicted in Stephens's papers. Cragg and Naidu consider these atypical forms to be degenerate forms of the sub-tertian parasite which occur when successive attacks of fever over a long period have reduced the patient's vitality to a serious degree.

J. D. Thomson [3] has published some useful notes on the treatment of malaria with quinine by intravenous injection. A 20 per cent. solution of quinine bi-hydrochloride is used. An ounce of the salt is dissolved in 120 cc. of saline solution (0·8 per cent. or thereabouts), and the volume is then made up to 160 cc. by the addition of saline. The solution is heated until it boils, and is kept in the dark in a well-stoppered sterile bottle. The solution should be quite clear, and each dose is again brought to the boil before use. Each cc. of the solution contains gr. ij. of the quinine bi-hydrochloride. An ordinary 5 cc. syringe is used, and a sharp fine-bore needle, which is introduced into the vein, and from 4 to 5 cc. of the solution are injected slowly (15 to 20 seconds per cc.).

In cases of sub-tertian malaria with remittent fever a single intravenous injection of gr. xv. of the quinine bi-hydrochloride was sufficient to break the attack, and once this is attained doses of quinine by the mouth, formerly insufficient to reduce the temperature, were now sufficient to keep it down. Ring forms of the parasite quickly disappear from the circulating blood after the injection, but crescents were not directly affected. The intravenous injection was given as soon as ring forms were found in the peripheral blood. In benign tertian malaria, a single intravenous injection of gr. xij. of the quinine bi-hydrochloride, given during a paroxysm, was sufficient to break the attack, so that the paroxysm next in order did not occur. All stages of the schizogonous cycle of the parasite, *P. vivax*, present in the circulating blood are directly affected by the injection, but not to the same extent. The young forms, before they pass the ring stage, are most affected, then the active amœboid forms. Gametocytes are the last forms of the parasite to disappear from the peripheral blood. The procedure recommended in benign tertian malaria is to give the first intravenous injection at the very end of the hot stage. Subsequent intravenous injections should be timed to be given at what would have been about the beginning of the hot stage in the paroxysms next in order, had the

cases remained untreated.

Thomson also makes some interesting observations on the morphology and development of the malaria parasite.   It is not yet known in what way or in what form the parasite survives the long periods which sometimes elapse between relapses.   Schaudinn elaborated a theory which assumes that only female gametocytes survive in the intervals between attacks, maintaining their existence in a " resting stage," if not in the peripheral blood, in one of the deeper organs. Under certain imperfectly known conditions these resting forms are supposed to multiply parthenogenetically (*i.e.*, without fertilization with a male gamete), and to produce a brood of merozoites, which are the starting point of a fresh series of schizogonous generations. Thomson believes that Schaudinn misinterpreted the appearances, and mixed up two independent phases of the parasite.   Thomson's observations suggest that the forms figured by Schaudinn in support of his hypothesis are compound forms, combinations of gametocyte and schizont.

Greig and Ritchie [4] publish a note on the treatment of the enlarged spleen of chronic malaria by the combined use of quinine with mercuric chloride.   The procedure was to administer intravenously 11 cc. of a 1 to 1,000 mercuric chloride solution in saline on alternate days, eight doses in all being given, and a daily dose of gr. xxx. of quinine in three portions.   This form of treatment, originally suggested by Barlow, was found to be of considerable benefit, often bringing about a rapid and considerable reduction in the size of the spleen, which is not seen under the influence of quinine alone.   The mercuric chloride seems to reinforce the action of quinine.   In this connection it is of interest to recall that, in the treatment of syphilis with mercury, it has been pointed out that quinine will frequently reinforce the action of the mercury.

KALA-AZAR AND LEISHMANIASIS.

Sir Leonard Rogers [5] gives further details of the treatment of kala-azar with antimony based on an experience of two years. A 2 per cent. sterile solution of tartar emetic is employed, and is injected intravenously.   For an adult, first the dose is 4 cc., and, if the reaction is not severe, the dosage is continued with 5, $5\frac{1}{2}$, 6, $6\frac{1}{2}$, and 7 cc., the injections being given as a rule every third day. This dosage is for the average Indian adult; for the heavier European the maximum dose may be up to 10 cc. A good rule for the *maximum* dose is that this should be 1 cc. of the 2 per cent. tartar emetic solution for every 10 lbs. of body weight, but not exceeding 10 cc.   The following table summarizes the results of tartar emetic treatment in 35 cases of kala-azar in the European Calcutta Hospital :—

Cured - - - - - - - -	28
Apparently cured but still in hospital - - -	3
Improved but left hospital prematurely - - -	3
Died of tuberculosis after cure of kala-azar - -	1
	35

This is a wonderful record considering the almost hopeless outlook

in kala-azar previous to the introduction of antimony treatment.

Sinton [6] gives notes of six cases of cutaneous leishmaniasis (oriental sore) treated with injections of tartar emetic; from three to nine injections were given. All the sores healed completely.

Scott [7] contributes a paper on " frontier sores." On the North-West Frontier (India) they are well known and are apparently a cutaneous leishmaniasis or true oriental sore, and do well under tartar emetic injections. In parts of Assam, on the North-East Frontier, another and distinct variety of frontier sore is met with. It is nearly always situated on the legs below the knees, is extremely painful, and does not seem to be a leishmaniasis. It is akin to, and possibly identical with, tropical phagadæna or *ulcus tropicum*. The treatment by ordinary methods is very unsatisfactory. A rapid cure may be effected by scraping under an anæsthetic and applying pure formalin, and formalin is lightly applied once a day for two or three days; this never fails to produce a rapid cure.

AMŒBIC DYSENTERY.

Wenyon [8] describes a new species of *entamœba* (*E. nana*) parasitic in man. It is one of the commonest protozoa in the human intestine in Egypt, and has previously been confounded with *tetramitus* or with *A. limax*. The free-living amœbæ are very small, measuring 5 to 10 microns in diameter. They are as a rule sluggish, throwing out one or more blunt ectoplasmic pseudopodia, and may be very vacuolated and contain bacteria, or they may be quite homogeneous. The nucleus can rarely be detected in the living amœbæ; it has a clear nuclear membrane and a large centrally placed chromatin mass, which is often irregularly shaped. The cysts are oval, spherical, or somewhat irregular in shape, 7 to 8 microns in diameter when spherical. They are usually pale and whitish in colour and structureless, and the nuclei are only occasionally seen even when treated with iodine. Stained with iron hæmatoxylin, either one, two or four nuclei are seen to be present. The chromatin is generally arranged as a mass at one side of the nuclear membrane, and a fine filament frequently connects the mass with a granule on the opposite side of the membrane; the same type of nucleus can often be made out in the free amœbæ. *E. nana*, like *E. coli* and *E. histolytica*, cannot be cultivated on agar.

As regards treatment of amœbic dysentery and carriers, Wenyon obtained the best results by a daily one-grain injection of emetin together with half-a-grain dose by the mouth, the course of treatment extending over twelve days. When one line of treatment fails, a modification may bring about cure. Methyl emetin sulphate was not so successful as emetin, and thymol was found to have no effect.

With reference to the conclusions of Knowles and Cole on entamœbic cysts and entamœba summarized in the last " Review of Tropical Diseases " (THE PRACTITIONER, October, 1917, p. 359), Brug,[9] in a criticism of their results, suggests that the material employed contained for the most part *coli*-cysts, which greatly outnumbered any *histolytica* cysts that may have been present, and that therefore their findings

justify no conclusion about the unity of *E. coli* and *E. histolytica.*

Dobell and Jepps[10] come to the conclusion that *Entamœba histolytica,* Schaudinn, the human dysentery amœba, is a collective species, comprising a number of distinct races, strains, or pure lines, distinguishable from one another by the size of the cysts which they produce. These races remain constant in character within a given host, and two different races may co-exist side by side in the same host. The existence of at least five distinct races has been demonstrated. There is no evidence that the different races differ in their geographical distribution, or in any character save size.

Walker and Emrich[11] have obtained apparently satisfactory results in the treatment of amœba carriers with oil of chenopodium, and consider that this drug is worthy of an extended trial. Their method of treatment is as follows :—

1. Magnesium sulphate, $\frac{1}{2}$ to 1 oz., is given at 6 a.m.
2. Oil of chenopodium, 16 minims in gelatine capsules, is given at 8 a.m., 10 a.m., and 12 noon.
3. Castor oil, 1 oz., with 50 minims of chloroform, is given at 2 p.m.

These doses are for adults. Of 14 cases treated in this way, 10 were apparently cured. The treatment may be repeated two or three times with one day's interval between. (Oil of chenopodium, oil of American wormseed, goosefoot oil, is distilled from *Chenopodium anthelminticum.* It is an anthelmintic, and has been used in round worm and ankylostome infections. Official in United States *Pharmacopœia.*)

DENGUE FEVER.

Cleland and Bradley[12] have investigated the transmission of dengue fever in Australia. Epidemic dengue in Australia is approximately co-extensive with the known distribution of *Stegomyia fasciata. Stegomyia* caught in a dengue-infected district, and some of which were known to have fed on a dengue patient on the first and second days of illness and transported to a non-dengue district, reproduced the disease in four out of seven persons bitten by them. The blood of patients suffering from an attack of dengue can reproduce the disease when inoculated subcutaneously into healthy persons. The virus of dengue is present in the blood as a whole. With Pasteur-Chamberland filtrates of infected serum and corpuscles, one positive result was obtained out of five experiments. The virus is present in the blood on the second and third days of the disease, possibly on the eighth day, but probably not on the fourteenth day. *Culex fatigans* does not appear to be capable of conveying the disease.

TYPHUS FEVER.

The causative organism of typhus fever still remains uncertain; various bacterial organisms and a spirochæte have been described.

A remarkable reaction has been observed by Weil and Felix[13] in typhus fever. It is the agglutination of a particular bacillus of the

Proteus group by typhus blood. The bacillus (termed " X 19 ")
was isolated two or three times from typhus patients (from the urine)
out of several hundreds of trials. It is not suggested that it is the
causative organism. But the blood serum of typhus, taken between
the fifth and the fifteenth day of the disease, agglutinates this bacillus
in dilutions of from 1 in 500 to 1 in 1,500. Normal serum and the
serum in other diseases never agglutinates Bacillus X 19 in a dilution
higher than 1 in 25. The reaction seems to be so constant and specific
that it may be made use of for purposes of diagnosis.

ULCERATING GRANULOMA.

A good account of 20 cases of this disease in the female is
given by Curjel.[14] This disease was ascribed by Cleland and Wise to
a spirochæte. A. da Matta[15] believes that it is due to a bacterial
organism which he names *Calymmato bacterium granulomatis*, the
presence of which may be made use of for diagnosis. Smears are
made from a fragment of tissue taken from *beneath* the superficial
part of the ulceration, and preferably from an area recently invaded.
The smears are fixed with methyl alcohol and stained with Giemsa.

Antimony is now stated to be a cure for this condition. A 1 per
cent. solution of tartar emetic is given intravenously. Three to five
injections are given, a dose every day or every two or three days.
The first dose is from 2 to 4 centigrams, and this is increased up to
16 centigrams. The tartar emetic solution should be freshly prepared
and sterilized in the cold by passing the solution through a sterile
Chamberland or Berkefeld filter candle.

LEPROSY.

Sir Leonard Rogers[16] publishes the results of two years' experience
in the treatment of leprosy with sodium gynocardate and chaul-
moograte, salts of fatty acids of chaulmoogra oil. The former is a
mixture of two or three fatty acids of a low melting point (29° to 43° C.),
the latter of acids of a higher melting point (57° to 62° C.). A mixture
of the sodium salts of the three highest melting point acids (43°, 56°
and 61° C.) recently obtained from the mixed hot and cold pressed
oil has been found most suitable. It is dissolved in water in a
strength of 3 per cent., so that 2 cc. = gr. i. of the salts. The solution
should be sterilized by heat and ½ per cent. carbolic acid added. The
solution is given intravenously, commencing with half-a-grain
(= 1 cc.) increasing by ½–1 cc. until 2 to 2½ grains are reached, pro-
vided severe giddiness is not produced. The injections are given
once or twice a week, and on the other days two-grain tablets or
pills are given by the mouth after meals, beginning with one three
times a day and increasing by one daily until 10 or 12 are taken
each day.

Between one and two years' treatment is required. The lesions
have disappeared in 50 per cent. of cases treated by this method
when applied within three years of the onset of the disease, but in cases

of from 3 to 15 years' duration, only 25 per cent. have cleared up under the treatment.

PLAGUE.

Gloster and White [17] have made a critical epidemiological study of the occurrence of plague in the United Provinces of Agra and Oudh during 1911–12. They give the following summary of their conclusions: " The association of unusual humidity during the winter months in certain districts with severe epidemics of plague is so constant a phenomenon that we feel justified in concluding that one stands to the other as cause to effect. We have further good grounds for believing that this cause exercises its effect mainly through its influence on the length of the life of rat fleas when separated from their host, for the longer a rat flea is able to survive in such circumstances the greater are its opportunities, in an infected area, for conveying the plague bacillus either to rats or to human beings."

The prompt decline of plague epidemics in Northern India with the onset of the hot season has been repeatedly noticed, and the Plague Commission concluded that a plague epidemic is checked when the mean daily temperature passes above 80° F., and especially when it reaches 85° F. or 90° F. The fact that the plague bacillus disappears from the stomach of the flea more rapidly at high temperatures than at lower temperatures has been suggested as a possible explanation. Subsequently the Commission noted that variations in atmospheric humidity influence the seasonal prevalence of the disease, variations in the percentage humidity of the atmosphere being associated with variations in the average number of fleas found per rat.

St. John Brooks [18] has, therefore, studied the influence of saturation deficiency and of temperature on the course of epidemic plague (by saturation deficiency is meant the difference between the actual tension of aqueous vapour present in the atmosphere at the temperature in question and the tension of aqueous vapour that would be present in a saturated atmosphere at the same temperature).

His conclusion is that plague does not maintain itself in epidemic form when the temperature rises above 80° F., accompanied by a saturation deficiency of over 0·30 inch, and that plague epidemics are rapidly brought to an end in the presence of a high saturation deficiency, even when the mean temperature has been considerably below 80° F.

HELMINTHS.

In a report on an ankylostome inquiry in the Darjeeling District, Clayton Lane [19] states that neither beta-naphthol, nor eucalyptus, chloroform, and castor-oil mixture have proved as efficient as thymol for expelling the worm. The standard dose of thymol for adult adopted was one drachm of thymol, divided into three portions administered at intervals of one hour. The one course of thymol cannot be expected to expel more than 60 per cent. of the worms present.

Oil of chenopodium, which has acquired a considerable reputation

in America, of which country it is a product, was not tried as it could not be procured (*see also* under " Amœbic Dysentery ").

Hilario and Wharton [20] give a good account of a rare fluke, *Echinostoma ilocanum*, which was first found by Garrison in Manila in 1907. Five cases were met with harbouring this intestinal parasite (the type species of the genus *Echinostoma* is *E. echinatum*, met with in domestic ducks and geese).

The fluke in length varies from about 4 mm. to 7·8 mm., and in breadth from about 1 mm. to 1·6 mm.; on account of its small size it is difficult to detect in the stools, particularly as it is little pigmented but is transparent and grey. It has a ventral sucker in front of which is the head region with an oval sucker, sub-terminal in position, and a wreath of oral spines, 30 to 50 in number may surround the mouth and oral sucker, but they are very unstable and are liable to be almost entirely lost. The cuticle may be smooth or may be more or less covered with scale-like spines, which are very unstable and liable to be lost. The ova have a thin shell with operculum at the smaller end, and are not segmented when passed; they measure 89–111 microns in length and 53·5 to 82 microns in breadth. The symptoms presented by the cases were anæmia with occasional headache and dizziness. No definite pathological changes have been found.

LATHYRISM.

This disease, which is well known in India, occurring particularly in times of famine or scarcity, is characterized by he development of spinal paraplegia. It is caused by the use as food of the pulse *Lathyrus sativus*, the " chickling vetch."

Stockman [21] has investigated the disease experimentally in monkeys. Monkeys fed on the pulse develop paresis of the motor nerves, but the nerves show little change and the spinal cord shows none.

The pulse is practically identical in composition with other peas as regards protein, fat, and carbohydrates. The poisonous body appears to be an alkaloid, but is present in very small quantity, 300 grams of seed husks yielding but a mere trace. The action of the poison is gradual and cumulative.

ACCLIMATIZATION TO THE TROPICAL SUN.

Shaklee [22] has conducted experiments with monkeys on the effects of, and on the factors bringing about acclimatization to, the tropical sun. Unacclimatized Philippine monkeys exposed to the sun in Manila may die from heat-stroke in the course of from several minutes to several hours, depending upon the conditions. The factors making for a rapid death are: (1) a hot sun; (2) proximity of a large, hot surface, such as the ground or a roof; (3) high relative humidity of the atmosphere, and (4) a low wind velocity, death being due to an accumulation of heat in the body. The effect of the sun's rays alone is comparatively slight.

Monkeys on a suitable diet become acclimatized to the conditions

mentioned, if exposure to the conditions be gradual. The acclimatization consists in an increased sensitiveness of the nervous mechanism regulating body temperature, producing an increase in the rate of perspiration. A small dose of atropin may cause death of an acclimatized monkey by stopping perspiration.

Healthy white men may similarly be readily acclimatized to a tropical climate.

REFERENCES.

[1] O. H. P. Pepper : *Amer. Journ. Med. Sciences,* Vol. CLV., No. 1, 1918, p. 70.

[2] F. W. Cragg and G. K. Naidu : *Ind. Journ. Med. Research,* Vol. V., No. 3, 1918, p. 458.

[3] J. D. Thomson : *Journ. Roy. Army Med. Corps,* October, 1917.

[4] E. D. W. Greig and W. D. Ritchie : *Ind. Journ. Med. Research,* Vol. V., No. 2, 1917, p. 401.

[5] L. Rogers : *Ind. Med. Gazette,* July and August, 1917, pp. 241 and 265.

[6] J. A. Sinton : *Ind. Med. Gazette,* July, 1917, p. 239.

[7] L. B. Scott : *Ind. Med. Gazette,* July, 1917, p. 231.

[8] C. M. Wenyon : *Human Intestinal Protozoa in the Near East,* 1917.

[9] S. L. Brug : *Ind. Journ. Med. Research,* Vol. V., No. 3, 1918, p. 491.

[10] C. Dobell and M. W. Jepps : *Parasitology,* Vol. X., No. 3, 1918, p. 320.

[11] E. L. Walker and W. Emrich : *Journ. Amer. Med. Assoc.,* May 19, 1917.

[12] J. B. Cleland and B. Bradley : *Journ. of Hygiene,* Vol. XVI., No. 4, 1918, p. 317.

[13] *See* Abstracts in *Bull. de l'Inst. Pasteur,* Vol. XVI., No. 7, 1918, pp. 219–224.

[14] D. F. Curjel : *Ind. Med. Gazette,* 1917, p. 305.

[15] A. da Matta : *New Orleans Med. and Surg. Journ.,* June, 1917.

[16] L. Rogers : *Ind. Journ. Med. Research,* Vol. V., No. 2, 1917, p. 277.

[17] T. H. Gloster and F. N. White : *Journ. of Hygiene,* Vol. XV., 1917 (Plague Supplement), p. 793.

[18] R. St. John Brooks : *Ib.,* p. 881.

[19] Clayton Lane : *Ind. Journ. Med. Research,* Vol. V., No. 2, 1917, p. 350.

[20] J. S. Hilaris and L. D. Wharton : *Philippine Journ. Science,* Vol. XII., Sect. B, No. 4, 1917, p. 203.

[21] R. Stockman, *Edin. Med. Journ.,* November, 1917.

[22] A. O. Shaklee, *Philippine Journ Science,* Vol. XII., Sect. B, No. 1, 1917, p. 8.

THE ADMINISTRATION OF CONCENTRATED INTRA-VENOUS INJECTIONS OF NOVARSENOBENZOL IN THE TREATMENT OF SYPHILIS.

By S. E. DORE, M.D., M.R.C.P.

Physician for Diseases of the Skin, Westminster Hospital, etc.

INJECTIONS of the " neo " or " nov " arsenobenzol preparations in concentrated solution present many advantages over the method in which a large quantity of solution is injected by gravity, air-pressure, or by the two-way syringe.

These advantages may be stated briefly as follows :—

1. Simplicity of apparatus, consisting only of a small syringe and needle which are portable and easily sterilized.
2. Facility and rapidity of injection, ensuring much saving of time in hospital practice and greater convenience in individual cases when the patient is treated at home.
3. Diminished risk of severe reaction, the symptoms of which are generally slight or absent, and equally satisfactory therapeutic results.

The sole disadvantage is the risk of injecting some of the concentrated solution into the cellular tissues, and attention to the following points may enable those who are not experienced in this particular method to avoid the mishap.

The Syringe.—A 10 cc. syringe is quite large enough; a 20 cc. syringe is less easy to manipulate, and the shoulder is apt to get in the way and prevent the needle being approximated to the skin at the proper angle. The needles generally supplied with it are also too coarse. Many of the French all-glass syringes hold a little more than 10 cc., and this is an advantage because there is more room for the draw-back of the piston, but the same end is attained by dissolving the drug in 9 cc. in an ordinary Record syringe.

The Needle.—This should be from $1\frac{1}{2}$ to 2 in. long and not more than 1 mm. gauge, and should fit well over the nozzle of the syringe. It is easier to pierce the vein with a fine than a coarse needle, but it must not be so fine as to prevent the free flow of blood backwards into the syringe when the piston is withdrawn. The bevel should be rather short, although this is not of great importance in a fine needle, and the point must always be kept sharp—this may be accomplished by occasionally touching it up with a small slip of carborandum. Needles should not be boiled, but may be kept conveniently in a corked test-tube in methylated spirit to which a few drops of lysol or lysoform may be added.

Preparation of the Patient.—The patient should not take solid food for three or four hours before the injection, and it is advisable to order

an aperient, such as magnesium sulphate, the previous night. He should lie on a high couch in a good light or the operator may sit so as to be on a convenient level with the patient. The skin is painted once only with tincture of iodine so as not to obscure the vein, and alcohol or ether should not be used. A piece of rubber tubing or a looped bandage, placed above the elbow and drawn sufficiently tight to impede the venous circulation, is held by an assistant or by the patient, who is also given a rolled bandage to grasp in the hand. If the veins do not stand out, flexing and extending the arm or a little massage from the wrist upwards, which may be accomplished by the left hand of the operator, will cause them to become prominent. The ampoule containing the drug is opened and the powder completely dissolved, without allowing it to stand too long, in 9 cc. of cold or tepid, sterile, freshly distilled water in a wide-mouthed bottle or beaker; if desired the distilled water may be kept ready for use in sealed glass ampoules. The solution is then drawn into the syringe, the air expelled in the usual way, and the needle firmly fixed on and dipped into sterilized water to remove the arsenical solution adhering to it.

Selection and Fixation of Vein.—Any suitable vein may be chosen, but preferably one in the bend of the elbow, the median cephalic or basilic being generally the most prominent and least movable. Veins running over the condyles often give more trouble from their mobility than those less easily visible in the ante-cubital fossa, and the latter can often be felt when they cannot be seen. It should never be necessary to cut down on the vessel except, perhaps, in fat subjects or young children.

Injection of the Solution.—Having selected a vein, the first and second fingers of the left hand are placed on either side of the vessel, and slight downward and lateral traction exerted to fix it and prevent it from slipping away from the needle. The point of the needle is now placed over the vein *close* to the skin with the bevel upwards and is pushed into skin and vein by a slight stabbing movement, the syringe at the same time being slightly lowered so that the vein is not transfixed.

The needle can often be felt to penetrate the vein wall and become free in the lumen, but a much more certain test is that blood will immediately flow backwards into the syringe. When this occurs the tourniquet is released, the hand grasp relaxed, and the solution slowly injected. If there is no back flow of blood the piston should be slightly drawn back when blood will appear in the syringe, but if there is still no flow the needle cannot be in the vein and another attempt must be made. Sometimes the point of the needle becomes dislodged during the injection, and if there is resistance to the flow of solution into the vein, not due to grit in the syringe or blocking of the needle as the piston is pushed forwards or if a swelling appears under the skin, undue pressure must on no account be exerted, but the piston must again be withdrawn to ascertain if the needle is in the vein. By means of this little manœuvre, which is in every way preferable to that of first puncturing the vein with the needle alone, it is

always possible to ascertain whether the needle is in the vein, and there is no fear of the solution finding its way into the cellular tissues.

Failure to pierce the vein is generally due to: (1) The needle entering the tissues over the vein. To avoid this the needle must be sharp and held with the bevel upwards. Otherwise the point may not pick up the vessel and will glide over its surface. After piercing the skin, the syringe should be raised so as to increase the angle with the surface and again pushed downwards. Some recommend that the skin should always be punctured first and the vein afterwards in two steps. (2) The needle entering at the side of the vein. To prevent the vein from slipping away from the needle, when the puncture is made, great care must be taken to fix it with the two fingers as already described or to grasp the back of the elbow in the hand and tighten the skin with the thumb. The vessel can sometimes be pushed towards the point of the needle by the tip of the left index finger and thumb and the point thus induced to engage its lateral wall. (3) The needle transfixing the vein and passing through the opposite wall. This may occur if the bevel of the needle point is too long, or if the operator, standing too much above the patient, holds the syringe too vertically, or if the patient's arm is in the flexed position. It may be remedied by slightly withdrawing the needle and rotating it to free the point. There is seldom any difficulty with the injection if these simple precautions are taken. Neglect of them, and especially that of having a sharp fine needle, may give rise to a good deal of trouble.

During the past year, I have employed only the " concentrated method " in the V.D. clinic at Westminster Hospital, and have found it superior in every way to the " dilute method." There are seldom any symptoms of reaction, and the patients are allowed to return to their homes immediately after the injection.

In two cases, there was considerable pain and œdema of the arm as the result of solution entering the tissues. In these slight infiltration at the site of injection remained for about three weeks and cleared up without further trouble. There have been no severe reactions or complications in any of the other cases. Of the preparations of the " 914 " series I have tried, novarsenobillon was found to be the best and was used in the great majority of cases. With regard to the dosage, each case must be treated according to the stage and degree of the infection. I generally give a preliminary course of six injections of 0·6 grm. at intervals of a week, increasing the dose to 0·9 grm. if necessary, due regard being paid to the presence of any contra-indications. In middle-aged patients, it is advisable to begin with 0·3 or 0·45 grm., and prolong the intervals to a fortnight or more. Ten or twelve weekly intramuscular injections of mercury are given simultaneously, and if a chancre is present this is treated locally with calomel ointment.

The patients are then given a course of iodide of potassium followed by mercury by the mouth for another three months, and the blood is again tested after three months without treatment.

INTRAVENOUS INJECTIONS OF ARSENIOUS AND MERCURIC IODIDES IN SYPHILIS AND YAWS.

By R. L. SPITTEL, F.R.C.S.

Surgeon, General Hospital, Colombo ; Lecturer on Operative Surgery, Ceylon Medical College.

THE discovery of salvarsan has within recent years spurred scientific effort to such an extent, that already the Eldorado of chemiotherapy has yielded, and is continuing to yield, synthetic products, differing little in their effects from the original salvarsan. In spite, however, of the glamour of the new discovery, and of the splendid foundation of reasoning and experiment on which it was reared, it was found to fall short of first expectations. For not only does the *therapia sterilizans magna* still remain a Utopian dream, but the consensus of opinion now seems to be that salvarsan alone is insufficient to cure syphilis, unless its admittedly powerful action is supported by mercury and iodides. Imbued though we may be, therefore, with the importance of chemiotherapy, we are not yet in a position to look with intolerance on methods unsupported by the same wealth of scientific reasoning, provided always that they stand the test of good clinical result, which, after all, must ever remain the final court of appeal.

It is on these grounds I venture to publish the results I have obtained with certain solutions of arsenious and mercuric iodide that have given me the greatest satisfaction for a period of over three years, and which I now habitually employ in my treatment of syphilis and yaws. The discovery of salvarsan, epoch-making in itself, has an added importance in that it has demonstrated the value of administration of drugs to the point of tolerance by the intravenous route in the treatment of constitutional disease.

I am aware that mercury has been, and is being, given intravenously to-day. Bacelli first introduced it as long ago as 1893, but the dosage employed was relatively small. As for the iodides they have not to my knowledge been employed intravenously to any great extent in the treatment of syphilis and yaws.

The comparison between salvarsan, and mercury and iodides has not up to the present been a fair one, for the reason that the older drugs have not, like salvarsan, been administered in massive dosage by the intravenous route. Even with the handicap all in favour of salvarsan, the older drugs administered intensively gave results not far behind those obtained with the latter. For does not mercury often remove the indurations of chancres and lymphatic glands more efficiently than salvarsan ? Are not the effects of iodides on gummata ever a source of fresh surprise to us ? The remarkable power of iodides in causing the absorption of the neoplasms of yaws and syphilis is one of the phenomena of medicine. This drug, though used chiefly in the later stages of syphilis, is of the greatest importance in the early stages. Neisser's experiments on apes led him to advocate energetic iodide treatment in the early stages of syphilis, and experience has taught

us that this is correct.   Further, all syphilitic lesions react better to
a combination of mercury and iodide than to one or other.   Pouchet
says iodides act by stimulating lymphoid tissue; they probably act
by stimulating leucocytosis as much as by direct bactericidal action.

MERCURIC AND ARSENIOUS IODIDE INJECTIONS.

Soon after the outbreak of the present war (since October, 1914),
when it became evident that supplies of salvarsan would be increasingly
difficult to procure, I set about experimenting on syphilis and yaws
with various preparations of mercury, iodides, arsenic, and antimony
in common use, taking as a working hypothesis dosage to the point of
tolerance by the intravenous route.   I was soon convinced that the
drugs contained in Donovan's solution lent themselves best to this
form of treatment.

The injection I advocate, given in the manner suggested here, will
be found to produce effects on syphilitic lesions, whatever their stage,
little short of those obtained with salvarsan and allied products.
I say this after three and a half years' experience, during which time
I have given over 5,000 of these injections in syphilis and yaws.   And
judging from the letters of appreciation I have received from workers
not only in Ceylon but also in India,* China, the Straits, etc., I
find that the results obtained by others confirm mine.

The following are the solutions I use.   In syphilis, I give 60 grains,
and in yaws 20 grains of mercuric iodide, if the first formula is used ;
but the later formula, given below, may be used without modification
in either disease :—

    (1) Mercuric iodide, grains 60 (40 or 20)   grm. 3·5 (2·5 or 1·2)
        Arsenious iodide, grains 87½ -   -   grm. 5·0
        Sodium iodide (1 per cent. sol.) minims 35 cc. 2·0
        Distilled water   to ounces 40 cc. 1000·0

The solution is made up in the following way :—It has to be ren-
dered *slightly alkaline*, and this is best done by first adding to it 20 minims
(1 cc.) of a 0·5 per cent. solution of phenolphthalein, and then neutra-
lizing by carefully adding drops of a 25 per cent. solution of sodium
hydrate (about 2 drachms are required).   When alkalinity is reached
the solution begins to assume a pink colour owing to the presence of
phenolphthalein, which thus serves both as an index of correct alkalinity
and as a colouring agent.   Once the neutral point is reached the alkali
is cautiously added drop by drop until a distinct pink colour is obtained.
If thought necessary glazed litmus paper may be used as a control of
alkalinity, but phenolphthalein is much the more delicate index.
It is important that the solution should be only slightly alkaline;
if too alkaline a precipitate results either immediately or after some
hours or days, and the efficiency of the solution is impaired.   Should
the colour fade on keeping it means that it has become too acid (due

* Drs. Frost and Dewadetta (*Indian Medical Gazette*, February, 1918)
report good results in the treatment of syphilis, of the central nervous system,
with intra-spinal injections of sero-arsenious and mercuric iodide, obtained
with my solution, and conducted on the lines of the Swift-Ellis sero-salvarsan
treatment.

probably to the presence of hydriodic acid);* in which case dilute alkali should be added until the original pink colour returns. The solution keeps well for several weeks, and if stored in a glass stoppered bottle under aseptic precautions may be drawn upon for injection without subsequent re-sterilization.

In an emergency, a very efficient injection may be made out of ordinary Donovan's solution, which is indeed the first solution I used in my earlier experiments. Donovan's solution is diluted with an equal quantity of strained sterile water; it is then rendered slightly alkaline by adding drops of a 15 per cent. solution of sodium hydrate while testing with litmus paper. The dose of this is from 7 to 12 cc. for intravenous administration. Its disadvantage is that it contains too much mercuric iodide, and is apt to cause much salivation if not cautiously used.

The solution I now use as a routine is as follows :—

    (2) Mercuric iodide, grains 50 (grammes 3·24).
        Arsenious iodide, grains 40 (grammes 2·59).
        Sodium (or potassium) iodide, drachms 8 (cc. 28·42).
        Aqua destillata, ounces 40 (cc. 1000).

Dosage and Mode of Administration.—8 to 15 cc. is the dose for an adult. The dose should be small to begin with and gradually increased according to tolerance. Four to six injections at intervals of four days to a week constitute a course. Several such courses should be given, with intervals of a month or six weeks between them.

The injection is administered with a 20 or 30 cc. glass syringe, into which the required quantity of solution is drawn; the syringe is then filled up to its full capacity with sterile water. This further dilution is necessary to obviate the slight phlebitis that is otherwise apt to ensue, rendering future injections into the same vein somewhat difficult. The solution is introduced into the vein after the usual manner of intravenous injections; should any of it escape into the tissues outside the vein, pain, tenderness and induration are caused.

The reaction depends on the dosage employed; it is negligible and evanescent if the dose is graded to tolerance. Heart and kidney disease are no contra-indication to cautious dosage. One or more of the following symptoms may be produced within a few hours of injection : Chill, fever, malaise, headache, vomiting, pains, and a burning sensation in the body. Later effects are gingivitis and salivation, coryza, lachrymation, diarrhœa and griping.

Results.—There is no lesion of *Syphilis* that is not markedly and rapidly benefited by the injection. One dose is often sufficient to cause the disappearance of recent lesions. The *primary sore* heals rapidly, leaving little induration behind. The lesions of *secondary syphilis* quickly disappear as well as such symptoms as headache, osteocopic pain, etc. Cutaneous syphilides of all kinds, mucous papules,

* Mr. C. T. Symons, who tested the effects of passing air continuously through the solution, found a tendency to acidification and decolorization by the fifth day. The addition of a few drops of alkali restores the original colour of the solution, and the addition of sodium iodide retards the tendency to acidification.

snail-track ulcers, etc. get well after one or two injections. *Tertiary* lesions such as gummata, ulcers, nodes, etc., improve with remarkable rapidity; so do joint-pains, headaches, bone-pains, and recent eye affections such as irido-cyclitis and keratitis. A constant feature of these injections is the inflammatory reaction (Herxheimer) that follows them. Any lesion, whether it be the primary sore, the cutaneous syphilide, the node, or the inflammation of the eye, becomes more painful and inflamed some hours after the injection before becoming painless and subsiding.

Yaws, too, is greatly benefited by the injection. The moist frambœsiform papules of *secondary* yaws are rendered dry and heal under their scabs, but not quite as quickly as with salvarsan. The pains in the joints and bones quickly disappear. In *tertiary* yaws recent and painful nodes become painless and quiescent after one or two injections. But nodes that have existed for months, it may be for years, are not reduced with anything like the same rapidity—the same is true of salvarsan; repeated injections eventually cause the disappearance of many of these.

The reduction of mercury dosage in the treatment of yaws is perhaps advantageous, for the drug does not exert the same beneficial influence as in syphilis. Iodide is the drug *par excellence* in yaws.

In judging the response of yaw lesions to treatment, there are certain facts to bear in mind : (1) Many of the ulcerations are secondarily infected with pus organisms which thrive under the surface crusts; (2) The patients are more often than not ill-conditioned and anæmic, and in them weak ulcers tend to persist through lack of recuperative power on the part of the tissues. In both these events, the results of treatment, whether with arsenious iodide or salvarsan, are apt to appear disappointing at first sight, if, in the one case local measures are not at the same time adopted, and in the other, drugs, such as cod liver oil and iron, are not given internally.

CONCLUSIONS.

1. Intravenous injections of arsenious and mercuric iodides constitute the best method of administration of mercury and iodide in syphilis and yaws. As evidence of this we have, besides the beneficial and quick results obtained, the constant appearance of the inflammatory reaction which may be taken as a measure of spirillicidal efficiency.

2. They have a field of usefulness in all stages of syphilis and yaws, in that, besides their spirillicidal qualities, they are capable of bringing about the absorption of new formations and infiltrations in the primary, secondary and tertiary stages of both these diseases.

3. Although the claim is not made that these injections should replace salvarsan and its derivatives, but rather reinforce them, still, when the latter are difficult to procure, or cannot be afforded by the patient, the injections here advocated are sufficient of themselves to bring about a cure.

4. Lastly the ease with which these solutions are prepared and administered, and their infinitesimal cost when compared with salvarsan —several hundreds of these injections may be given at the cost of one of salvarsan—place them at a great advantage.

THE TECHNIQUE OF LARGE INTRAVENOUS INJECTIONS.

By C. HAMILTON WHITEFORD, M.R.C.S., L.R.C.P.

Plymouth.

The tube-and-funnel method, acting by gravity, usually suffices for intravenous injection of small quantities of a solution (salvarsan, etc.) in a patient who is not collapsed. But, when employed for the introduction of several pints into a patient, who is in a state of shock, the tube-and-funnel technique not infrequently breaks down, the solution either failing to flow, or ceasing to run after only a few ounces have entered the vein.

The following procedure, which the writer has employed for 20 years, although not " new," may be described as " but little used."

In this method, the solution is injected into the vein by means of a Higginson enema syringe. The apparatus required includes a Higginson syringe, to which is attached one foot of stout-walled rubber tubing, with a lumen of one-eighth of an inch. At the end of this tubing is a metal cannula with a bulbous point. All junctions are secured with stout silk, tightly tied. Unless the junctions are thus safeguarded, the parts of the apparatus, while the injection is being made, are liable to be forced apart.

The solution is contained in an enamelled iron jug, the mouth of which is 5 to 6 inches in diameter. A piece of tape, or stout silk, is attached to the syringe, just beyond the bulb, and its ends tied to the handle of the jug, in order to prevent the syringe from slipping out of the jug.

The vein is exposed, the syringe, tubing, and cannula are filled with solution by a few squeezes of the bulb, and the cannula is tied into the vein.

The force required to make the solution pass through the lumen of the actively contracted vein of a shocked patient is considerable, and is worthy of notice by those who contend that, in shock, the veins are in a state of dilatation. As soon as the cannula has been tied into the vein, only one pair of hands is required to attend to the injection.

The method and the apparatus are simple, give the operator absolute control over the rate of flow, and are applicable to the emergencies of military and civilian practice for intravenous administration of citrated blood, saline, or other solutions.

———➤●✦●◄———

SCURVY.

By HERBERT VINCENT O'SHEA, M.B., B.Ch., B.A.O., L.A.H.I.

*Late Resident Surgeon, Mercy Hospital, Cork ; late Senior Resident
Physician, District Hospital, Cork ; late Temporary Lieutenant, R.A.M.C.*

THE observations recorded in this paper were drawn from personal experience of at least 400 cases of scurvy.

I have been able to study this disease, clinically, in all its stages, from a simple sponginess and soreness of the gums, to a well-marked ulcerative stomatitis, accompanied in some cases by extensive hæmorrhages into various parts of the body and severe constitutional symptoms. In this series the disease presented itself in various forms, one or more of the principal features being absent in some cases, while atypical signs predominated in others ; so that at times it was difficult to exclude, when first examining the patient, the presence of other diseases, and to make an absolute diagnosis of scurvy. In at least one instance, it was only on surgical procedure for the relief of acute abdominal symptoms, that the cause of the trouble was found to be scorbutic.

ÆTIOLOGY.

For certain reasons I do not propose to discuss the causation of this disease, but my experience leads me to make two statements with regard to this point—

(*a*) The previous health of the individual is an important predisposing factor, and influences the severity of the disease.

(*b*) The causative factor seems to be, to a large extent, the lack of fresh vegetables in the diet.

Considerable time has been spent in studying the ætiology of this disease, but there is a general consensus of opinion that " the primary and, in most cases, the only, cause of scurvy in adults " is the absence of fresh vegetable food. (Johnson Smith).[1]

The infective theory has not received much support, and although the transmission of the disease from one community to another has been reported, there is every reason to believe that this condition was really an epidemic form of stomatitis. My own experience of the disease has never led me to presume the presence of an infective agent in scurvy. There is also little to support the view that scurvy is chiefly due to the ingestion of tainted meat, etc., for it has occurred in breast-fed children or those fed on sterilized milk ; one would also expect to find symptoms of ptomaine poisoning in such cases, but in these 400 cases they have never come under my notice.

Wright views scurvy as an acid intoxication, the result of an

absence or deficiency of alkaline foodstuffs, or an excess of acid-containing foods. He classifies foods into three groups: those leaving on incineration (*a*) an acid ash; (*b*) a neutral ash; (*c*) an alkaline ash. He shows that animals fed entirely on the first group get scurvy, which can be cured by substituting foodstuffs belonging to the last group.[2] Holst proves that rabbits fed on a scurvy-producing diet can only be kept free from that disease if given fresh vegetables, but not if the vegetables are previously dried, even if sodium bicarbonate is added.[3] He also finds that certain fresh vegetables can prevent experimental scurvy and experimental neuritis, resembling beri-beri.[4] This suggests that both affections are deficiency diseases.

More recent and scientific work shows that substances called " vitamines " can be isolated from various living structures. These bodies are considered to be an essential constituent of the food, if the body is to be maintained in a proper state of health. These vitamines are present in fresh milk and in many of the antiscorbutic foods, especially lime juice.

CLINICAL SIGNS AND SYMPTOMS.

I will now discuss the symptoms and physical signs observed in these cases, and describe a few which illustrate the different clinical pictures presented by the disease.

The Mouth.—The first obvious feature is the condition of the gums, which are anæmic, spongy and tender. In a certain number of cases the condition proceeds no further, and under suitable treatment the gums soon become normal. If treatment is neglected, the condition becomes worse and swelling and inflammation result.

In the next stage of the disease ulceration appears, and the raw surface causes considerable pain, particularly on taking food. The result is that the patient is unable to take any solid food whatever, and a liquid diet is necessary. The teeth may become loose, and, in extreme cases, fall out. As a rule, when the gums return to their normal state the teeth become quite firm. The colour of the gums in advanced cases is usually dark red, but in bad conditions may be blue, or even black; hæmorrhages from the mucous membranes of the gums occur on the slightest pressure, and in some of the patients there was continuous bleeding from the gums until a general improvement in the condition of the tissues took place.

Occasionally the mouth presents an extraordinary appearance. The gums are much swollen, and may occupy nearly half the buccal cavity, inasmuch as they may reach the top of the teeth, which seem almost entirely to be embedded in them. The thickness varies from a quarter to a half an inch, and in some cases is associated with separation from the teeth. The teeth become loosened, and frequently it is possible to raise them *en masse*.

The odour from the mouth is fœtid to such a degree that, in some cases, it is impossible to approach the patient without a feeling of nausea. In particular cases this diseased condition is localized, but,

even so, may reach a bad state of ulceration, presenting a fungous appearance, which causes considerable pain, whilst the remainder of the gum, is only slightly affected.

One such case had a swollen face from the localized affection, and suggested the appearance of an alveolar abscess. In about 30 per cent. of the cases, pyorrhœa alveolaris was present, probably a secondary infection, and in bad cases the gums were covered with pus, which could be seen oozing from the sockets of the loosened teeth. The salivary glands were swollen and painful, and the patient frequently complained of tenderness on pressure beneath the angle of the jaw. This is not seen in mild cases, but is well marked in the more severe types; it is probably due to an extension of the inflammation from the gums to the tissues forming the floor of the mouth. Enlarged submaxillary lymphatic glands may also be found in such cases. I have frequently seen purplish patches on the hard palate, indicating hæmorrhage beneath the mucous membrane. I have also noted slight bleeding into the mucous lining of the cheek, where it comes in contact with the teeth.

One case had a penetrating wound of the lower lip. The outer wound healed perfectly, but the inner wound became infected from the septic inflamed gum, and set up a stomatitis of the mucous lining of the lower lip; this was very painful, and took a considerable time to heal.

Herpes occasionally occurs, and hæmorrhage takes place into the blebs. In one case, both lips and anterior nares were covered with a herpetic eruption. The vesicles became hæmorrhagic and finally coalesced.

The tongue is usually unaffected, but it may be swollen and indented by the teeth. I have had one case of glossitis with hæmorrhage into the affected part of the tongue.

Hæmorrhage.—One of the most remarkable features in a scorbutic patient is the great tendency to hæmorrhage into various parts of the body. It is true that no hæmorrhage may occur. I have had a case in which the only evidences of scurvy were spongy inflamed gums, pains in the legs, and some slight œdema of the ankles; but, as a rule, in the majority of cases, one always finds some evidence of hæmorrhage, even though it may be very slight.

In some cases, the only sign of hæmorrhage is a mild patechial eruption scattered over the skin of the legs, generally around the hair follicles. This rash may extend widely over the body and upper extremities, but in all my cases it was mostly confined to the legs. It occurs very slightly sometimes over the skin of the arms, but I have only seen it a few times on the trunk. In severe cases extensive hæmorrhages take place into the muscles, and may spread to the subcutaneous tissue and involve the skin. When this occurs the first thing one notices is that the patient complains of localized pain on pressure or movement. On examining the part a slight swelling or hardness is felt. As the subcutaneous tissue becomes infiltrated, swelling occurs, and a slight discoloration, resembling a bruise, is

noticed. Then venules appear on the skin, until eventually the area becomes swollen, inflamed, and brawny-looking. The skin is quite blue and tense, and the whole mass of tissue becomes of an almost wooden hardness. Under some circumstances there is considerable pain and œdema, and the condition receives the term " scurvy sclerosis."

These hæmorrhages are found nearly always on the legs, the reason for this probably being that the leg is the part of the body most exposed to injury. The legs also have to bear the weight of the trunk, and so are under a constant strain ; consequently, the weakened vessel-walls yield more easily to the pressure of the blood, and extravasation into the neighbouring structures ensues.

The site which appeared to be most affected was the popliteal space, the effect being sometimes limited to that area, and sometimes involving the entire neighbourhood of the knee-joint. This latter condition is so pronounced in some cases as to lead the physician to believe that the patient was simply suffering from an injury to the knee, causing swelling and inflammation of the joint. In bad cases, the flexor muscles are contracted, the knee is kept bent, and the patient resists any attempt at extension of the leg in consequence of the pain involved. When there is extensive hæmorrhage and swelling around the knee, it is difficult to say with certainty whether there is also hæmorrhage into the joint cavity. Several cases presented this difficulty; in one case, I believe there was some effusion of blood into the cavity of the knee. When hæmorrhage takes place into the joint, the pain and other symptoms are more decided, there is more limited range of movement, and the joint takes longer to return to its normal state. Extensive hæmorrhages frequently occur on the inner surface of the thighs and into the calf muscles.

Hæmorrhage may first make its presence known in the shape of small hard swellings along the shaft of the tibia. They are felt just as frequently at the inner and outer side of the head of the bone in the region of the epiphyses or at the lower end of the shaft near the ankle. These are slight hæmorrhages between the bone and the periosteum, which are painful, and when they occur along the shaft of the tibia, the skin, which is quite healthy looking, is slightly raised. On running the finger down the crest of the tibia, little nodules attached to the bone are felt. These nodules, if the patient is put under treatment, disappear in time. If they are not noticed at this stage, they may spread and the neighbouring tissues and skin become involved. I had one well-marked case of this kind, in which there was a large swelling below the knee occupying the upper third of the tibia. The skin was very tense, red, and glossy. It was painful and œdematous. I had this case X-rayed, and an effusion of blood was seen to be present between the periosteum and the bone.

In the scurvy of infants, the essential lesion is an extravasation of blood beneath the periosteum.[5] This is not confined to the epiphyses, but extends the length of the bone, thus distinguishing it from epiphysitis.[6] Swelling and tenderness in infantile scurvy is

usually caused by subperiosteal hæmorrhage, while extravasation of blood into the muscles and skin is very rare.

In adults, the chief hæmorrhage is into the muscles, and only occurs beneath the periosteum in the severer cases. The reason is, that in children the periosteum is more easily stripped from the bone and yields sooner to hæmorrhage, while in adults it is more adherent, and does not give way so readily. Another factor, I believe, that plays an important part, is that in the adult the muscles afford a greater protection for the bones; consequently, the former bear the brunt of knocks or injuries, and are thus more liable to hæmorrhage. This view is supported by the fact that the subcutaneous surface of the tibia, which has no muscular protection, shows, most frequently, clinical evidence of subperiosteal hæmorrhage.

I found hæmorrhage, exclusive of petechial rash, into the upper limbs in only 20 of the cases. The majority of these occurred on the forearm, and the region of the elbow; the wrist-joints were affected in a smaller number of cases. Occasionally the dorsum of the hand becomes œdematous, swollen, and painful, a condition due to a deep-seated hæmorrhage. In one case, I observed a large hæmorrhage over the biceps. I have never found any hæmorrhage on the trunk, with the exception of a slight purpuric eruption. In some cases, there were several painful and tender areas over the flat bones of the skull, but I could find no evidence of hæmorrhage. In children, subperiosteal hæmorrhages have occurred over the skull bones, giving rise to swellings, which may simulate sarcoma.[7] They may also occur over the scapula. In one case, the patient complained of pain over the inner end of the spine of the scapula, but there was no evidence of hæmorrhage beyond slight swelling and tenderness.

Pain.—The first symptom of hæmorrhage is pain or tenderness over the affected part, though either may occur independently of the other. Very often the patient complains of pains all over the body, without any evidence of hæmorrhage. Pain is frequently present about the knee joint, but careful examination proves that it is really at the head of the tibia near the epiphysial junction, where there is usually some slight hæmorrhage. Pain around the ankle joint is often present, in addition, so that in some cases, in which the other symptoms and physical signs are slight, if the patient is not carefully examined, the disease may be mistaken for rheumatism. The lumbar muscles are frequently the seat of pain and tenderness, though I have never personally seen any signs of hæmorrhage in that situation.

Œdema.—This is quite common in severe cases, when the legs are very swollen and hæmorrhagic. It may be only slight or considerable, and is particularly well seen about the ankles, suggesting the presence of renal disease. One patient was admitted with both legs, from the knees down, extremely distended with dropsy. No signs of hæmorrhage were present, and the gum symptoms were slight. I examined his urine carefully for albumen, blood, and casts, but the result was negative. After forty-eight hours' rest in

bed, and treatment, the legs presented a normal appearance, and the only evidence of the preceding condition was pain in the muscles of the legs. I had other cases of scurvy with persistent œdema of the ankles, but with no discoloration of the skin.

Fever.—In mild cases the temperature usually remained normal, but in advanced conditions fever was present, as well as in those cases in which secondary inflammation of any of the internal organs occurred. I found that many patients with moderately severe symptoms ran irregular temperatures, with excursions from $\frac{1}{2}$ to $1°$ F. Some bad cases, with extensive hæmorrhages, swelling and œdema of the legs, had intermittent temperatures reaching as high as $101°$ F., which last several days before returning to normal. The charts shown are from three cases, in two of which, in addition to severe stoma-
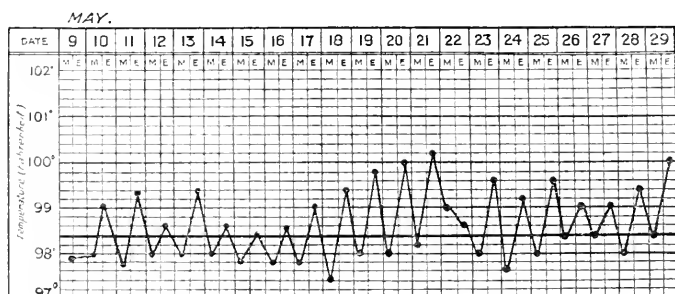
FIG 1.
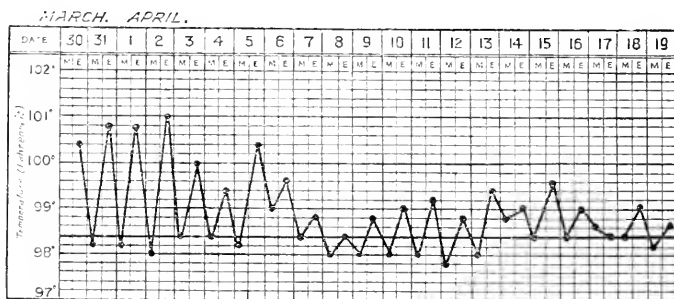
FIG. 2.

titis and large hæmorrhages into the legs, the constitutional symptoms were well marked, namely, headache, mental depression, great weakness, and anæmia. The skin had assumed a sallow, earthy tint, and in one case there was definite jaundice.

The following picture may present itself and lead to rather a serious mistake, particularly when occurring in isolated cases. A

patient exhibits swelling, inflammation, and œdema, with decided pain and tenderness over the tibia, accompanied by fever; the mouth condition is often so slight as to escape notice. A diagnosis of suppurative periostitis is made, and the patient treated accordingly. I have seen several such cases, which, if met with in private practice, might easily be mistaken for this condition; the stomatitis in these cases was practically absent. Cases have been described in which large effusions of blood beneath the periosteum have broken down into foul ulcers. Syphilitic nodules on the tibia with cachexia must be differentiated from scurvy, for the administration of mercury in the latter disease would be highly injurious to the patient.

Hæmorrhage from the Mucous Membranes.—These are not very common in scurvy; epistaxis, however, is said to occur frequently, but I have only seen it twice. Hæmatemesis is rare, and may occur in severe cases when the patient is very anæmic and the gastric mucous membrane irritable; vomiting in such a patient may, however, produce hæmatemesis. There was no case of hæmatemesis in the series, though some patients had gastric symptoms, dyspepsia and occasional vomiting. Hæmorrhage from the bowel was seen occasionally. One case had pain, apparently in the situation of the transverse colon, and was constipated for two days. He was given a dose of castor oil, and passed
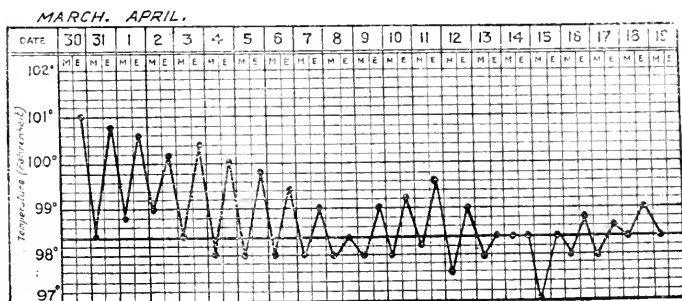
FIG. 3.

a large quantity of clear jelly-like mucus and some blood, apparently arterial. The stools were examined, and the presence of entamœba histolytica was suspected. Before emetine treatment was adopted, the symptoms had practically disappeared, and the stools became normal within three days following. It is possible that the passage of blood and mucus in this case was a scorbutic symptom, for the amount passed in the first instance was very considerable, and what one would expect from a large hæmorrhage into the wall of the bowel beneath the mucous membrane. If the symptom was due to the presence of entamœba, it is not likely that the blood and mucus would have disappeared from the stools in such a short period.

Still describes a case of infantile scurvy somewhat similar to the above, in which there was vomiting and diarrhœa with the passage of

blood and mucus. A large swelling in the situation of the transverse colon was felt through the abdominal wall, which was flaccid and sunken. At first it was thought that the swelling might be due to an intussusception, and attempts were made to reduce it, but without success. Suspecting that the condition might be scorbutic, he delayed operation, and the tumour disappeared; the child recovered on an antiscorbutic treatment. He believes that this was a case of hæmorrhage into the wall of the bowel.

The following case is of special interest, because it had been diagnosed as appendicitis :—

The patient had been ill for seven days previous to his admission to hospital, and when seen presented a typical picture of acute appendicitis; he was constipated, and the fæces contained no blood or mucus. Operation was decided upon, and on opening the peritoneal cavity, it was found that a large hæmorrhage had taken place into the wall of the cæcum, extending from the root of the appendix, which was otherwise healthy, up to as far as the hepatic flexure of the colon. There was also some hæmorrhage into the circumrenal tissues on the same side. Examination of the urine showed, in addition to a definite cloud of albumen, the presence of a few leucocytes and red blood corpuscles. There were no casts to be seen.

In this case, the only symptom of scurvy was hæmorrhage into the wall of the cæcum and ascending colon.

The bowels are inclined to be constipated, although in some instances a watery diarrhœa occurs, which, however, only lasts one or two days. Diarrhœa with the passage of blood may also occur.[8]

Tenderness over the liver and spleen is occasionally seen, and both organs may be slightly enlarged; in bad cases, jaundice may be present. Infarction of the spleen has been known to occur, though I have not seen it in any of my cases.

REFERENCES.

1 *The Practitioner's Encyclopædia of Med. and Surg.*, page 20. **2** *The Practitioner's Encyclopædia of Med. Treatment*, page 188. **3** *Brit. Med Journ.*, Oct. 31, 1908, page 1365. **4** *Tropical Society*, 1911. **5** Osler : *Prin. and Pract of Med.*, page 488. **6** Still : *Com. Disorders and Diseases of Childhood*, page 109. **7** *Ibid.* **8** Saville : *System of Clin. Med.*, page 590.

(To be continued.)

THE BREAKING OF VICIOUS CIRCLES BY SURGERY.

By JAMIESON B. HURRY, M.A., M.D.

THE morbid process known as the vicious circle plays a part of enormous importance in pathology.   It leads to the aggravation of disease, to the destruction of organs, to the termination of life; the *ars medendi* is largely concerned in arresting this pernicious circular reaction.

Organectomy.

Organopexy.

Lithotomy.

Decompression.

Resection.

Removal of Neoplasm.
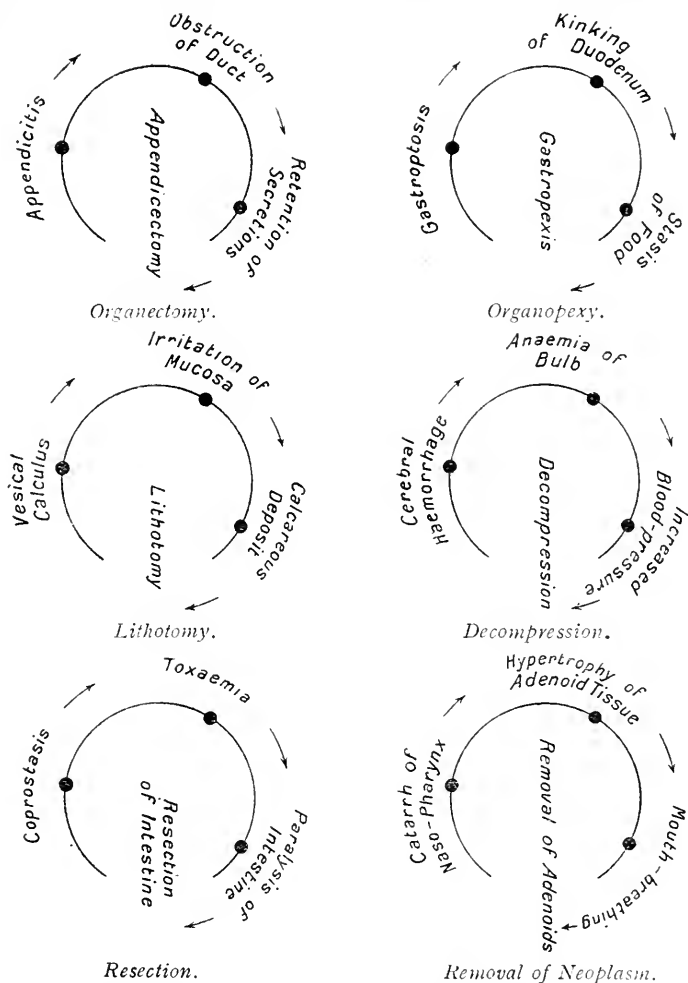
THE BREAKING OF VICIOUS CIRCLES BY SURGERY.

Some vicious circles can be broken by the *vis medicatrix naturæ,*

others by the drugs of the physician; for many the knife of the surgeon is indispensable. At such times :—

<div align="center">

οὐ πρὸς ἰατροῦ σοφοῦ
θρηνεῖν ἐπῳδὰς πρὸς τομῶντι πήματι.

" Skilful leach
Mutters no spell o'er sore that needs the knife."[1]

</div>

The importance of injurious circular reactions in pathology has as yet scarcely impressed itself on professional mentality. Many leading text-books make no allusion to them from cover to cover. A helpful philosophical insight into the processes of disease is thus lost, and with it that clearness of vision that promotes the accurate adaptation of remedy to disorder.

There may, therefore, be profit in drawing attention to some of the means the surgeon employs in the breaking of vicious circles. The following classification will be found convenient :—I.—Organectomy ; II.—Organopexy ; III.—Organoplasty ; IV.—Lithotomy ; V.—Stricturotomy ; VI.—Tenotomy ; VII.—Osteotomy ; VIII.—Decompression ; IX.—Removal of Neoplasms ; X.—Ligation of vessels ; XI.—Drainage ; XII.—Catheterization and other surgical measures.

I.—ORGANECTOMY.

The total removal of an organ may at times be required for the breaking of a circle. Appendicectomy and hysterectomy will serve as examples.

1. Appendicitis usually arises from some inflammatory condition which narrows the appendicular duct and causes a retention of secretions. Such retention in its turn aggravates both inflammation and obstruction, and eventually a closed septic cavity may result involving serious illness and even danger to life. Steward thus describes the morbid process :—

" The lumen of the appendix is so small under normal conditions that a very little swelling of the mucous membrane, such as would be produced by a mild degree of catarrh, must inevitably produce some degree of obstruction. This obstruction would result in stagnation for want of drainage, which again would cause a persistence of the irritation and swelling of the mucous membrane. It would appear that in this way a vicious circle may be set up."[2]

Appendicectomy breaks the circle.

2. Another operation which breaks a circle is the removal of a bulky, inflamed, and prolapsed uterus which is mechanically interfering with the uterine circulation and so aggravating its own enlargement. Procidentia uteri is then both cause and effect of congestion, and often can only be remedied effectively by hysterectomy.

Splenectomy for hæmolytic jaundice,[3] excision of the lacrymal sac for dacryocystitis,[4] prostatectomy for retention of urine, nephrectomy for pyonephrosis are other examples.

II.—ORGANOPEXY.

Various organs are liable to undergo displacement, and such displacement may lead to sequelæ which in their turn aggravate the

primary disorder.

1. An enlarged and loaded stomach sometimes sinks in the abdomen and pulls down the first section of the duodenum. Hence results a kink which hinders the escape of the gastric contents and provokes further gastroptosis. The more extensive the ptosis, the greater the kink and the more obstinate the stasis, *et ainsi de suite*.

Such a displacement may be cured by the operation of gastropexy, which restores the stomach to its natural position and retains it there, either by suturing the organ to the abdominal parietes or by shortening and strengthening the natural supporting ligaments. In successful operations the self-aggravating process is arrested and followed by recovery.

2. Hysteropexy is another operation which breaks the sequence often associated with procidentia uteri. This displacement may be due either to an increase of the forces that tend to depress the uterus, or to weakening of its supports, or to both factors operating simultaneously.

In many cases an abnormally bulky and heavy uterus, on the one hand, and a ruptured or weakened perinæum, on the other, are both present. The weaker the perinæum, the further the uterus descends; the further the uterus descends, the weaker grows the perinæum. Moreover, the prolapsed organ becomes congested and this congestion intensifies the prolapse.

In severe cases neither pessary, tampon, nor bandage retain the displaced organ. Hysteropexy is one of a variety of operations devised for the cure of the displacement. By the strengthening or shortening of the uterine supports the circular reactions may be interrupted and the disorder cured.

Colopexy, hepatopexy, and nephropexy are other operations with a more or less similar purpose.

III.—ORGANOPLASTY.

Under the title organoplasty may be grouped a series of operations devised in order to interrupt injurious correlations.

1. For example, intestinal obstruction creates a variety of such conditions. There may be coprostasis, toxæmia, meteorism, intestinal paralysis and aggravated stasis; coprostasis, kinking of the gut and aggravated stasis; intussusception, increased peristalsis, aggravation of intussusception; strangulation of a hernia, vomiting, aggravated strangulation; enteroptosis, obstruction, aggravated ptosis. Sometimes these disorders are curable by drugs. But in neglected cases, in which gangrene threatens or has supervened, enteroplasty is often required. The injured segment is removed, and the two ends joined end to end or anastomosed side to side.

2. Gastroplasty may be called for in the case of gastric ulcers when complicated with hyperchlorhydria, pyloric spasm and retention of the gastric contents. This concatenation of phenomena acting and reacting on each other leads to a grave condition of anæmia, malnutrition, and weakness. Various operations have been devised for its relief, including partial resection of the stomach and gastro-jejunostomy. By either of these operations the stagnation of the gastric

contents may be prevented; the hyperchlorhydria is arrested and the spasm of the pylorus subsides.   Pain ceases, appetite returns, and the patient regains the weight and strength that he has lost.

3. Partial resection of the thyroid is an operation performed in order to break a dangerous circle which may be established when the hypertrophied gland compresses the trachea and narrows its lumen, or by pressure on nerves excites a reflex respiratory spasm.   Acute dyspnœa may then result from any exertion that calls the supplementary respiratory muscles into action.   For these muscles, in contracting, press the goitre against the trachea, further diminish the lumen, and thus increase the dyspnœa, or the glottis may be closed in spasm.   The victim is caught in a dangerous vortex, and, unless promptly relieved by operation, dies miserably from self-strangulation.

Blepharoplasty is another operation which breaks the circles associated with entropion and ectropion of the eyelids.[5]

<div style="text-align:center">IV.—LITHOTOMY.</div>

Under the generic term lithiasis may be grouped various disorders associated with the formation of concretions in the tubes and cavities of the body through the operation of a circle.

1. As an example we may take the case of a vesical calculus, which may either form primarily in the bladder or descend into it from the kidney.   When a small calculus slips into a healthy bladder, the mucus secreted as a result of the mechanical irritation forms an envelope, which serves as a binding material in which successive layers of crystals are deposited.   The stone then continues to grow in an *acid* medium, the film of mucus continually attracting fresh crystals of uric acid or other constituent of the urine by molecular coalescence, while the enlarging stone perpetuates both the irritation and the secretion of mucus.

Sooner or later, however, bacterial infection usually supervenes, leading to cystitis and the precipitation of phosphates.   The layer of mucus then becomes a nest for phosphatic accretions, and the growth of the calculus proceeds in an *alkaline* medium.   The increasing calculus aggravates the irritation, which in turn leads to further phosphatic deposit and adds to the size of the concretion.   Many layers thus form successively, much as do the strata in a geological formation.   A similar sequence is observed when the concretion is vesical *ab origine.*

2. In the case of a biliary calculus the ætiological factors include the stagnation of bile, bacterial infection, and catarrh of the biliary passages, leading to a deposit of cholesterol, which forms a nucleus round which collect epithelial cells, bilirubin, calcium, and other pigments and salts.   Such a nucleus, even though minute, acts somewhat like a foreign body, setting up irritation and desquamation of the mucosa, the products of which adhere to, and increase the size of, the nucleus.   From such increased size result ingravescent irritation and catarrh, together with biliary retention and inspissation, and so the process is accelerated.   MacCallum thus describes the sequence :—

" All gall-stones contain a great deal of organic material derived from

desquamated epithelial cells and coagulated albuminous matter as well as pigment. Many of them contain bacteria, and are formed in infected bile and within a gall bladder which is inflamed, because in this vicious circle the presence of the stone aids in giving a foothold to bacteria, while they, in turn, through the inflammation they set up, aid in the growth of the stone."[6]

By the operation of lithotomy or litholapexy the surgeon interrupts these circular reactions. With the removal of the calculus the irritation ceases; the excessive deposition of salts and the increased production of mucus are arrested; the secretions again flow freely and check the bacterial infection which perpetuated the disorder.

V.—STRICTUROTOMY.

Various channels of the body are subject to stricture, a self-aggravating disorder which frequently calls for surgical aid.

1. A striking example may be met with when a coil of intestine is strangled in a volvulus or a hernia. The intestinal walls grow acutely congested from constriction of the blood-vessels, while the lumen is distended with blood and gas, such congestion and distension in their turn intensifying the strangulation. Frequently the tension causes more gut and mesentery to be drawn within the constricting ring, to become congested and strangled in their turn. As Barnard says :—

" these coils draw their mesentery along with them within the constriction which in this way becomes tighter and tighter in a vicious circle."[7]

By the operation of laparotomy or herniotomy the constriction may be relieved, and the circulation restored.

2. Another illustration is presented by stricture of the urethra associated with severe straining, hyperæmia of the mucous membrane, and aggravation of the stricture. The difficulty of micturition may be so great as to call for urethrotomy, which cures the trouble.

Allied to these conditions are various other forms of strangulation, *e.g.*, paraphimosis, constriction of the prolapsed cervix uteri by the vulvar folds, nipping of prolapsed hæmorrhoids, narrowing of the trachea by hypertrophied thyroid, etc. In all these cases operative measures may break the sequence.

VI.—TENOTOMY.

Orthopædic disorders are frequently complicated by injurious circular reactions. Tenotomy is of great service in remedying such disorders.

1. Acute anterior poliomyelitis will serve as an example. Indeed, two vicious circles may be established, one earlier in the course of the disease than the other.

The first circle is due to a disturbance of the reciprocal relations that exist between the tropho-motor neurons and their associated muscle cells. These two elements, in fact, form but a single unit : disease of the one involves disease of the other.

In the majority of attacks, the neurons of the anterior cornua become inflamed owing to the infective micro-organisms. If the

vascular storm quickly subsides, the neurons recover more or less completely, the percentage of recoveries amounting to *ca.* 15 per cent. Recovery, however, depends not merely on the central lesion, but also on the maintenance of the nutrition and contractility of the dependent muscles. If these muscles remain untreated and disused or are allowed to atrophy, their condition reacts injuriously on the damaged ganglion cells, since these lose the stimuli which should reach them from the periphery. In this way a vicious circle is established which perpetuates the disease.

Sir Robert Jones thus describes the process :—

" The muscle wastes from disuse and becomes incapable of responding to such feeble impulses as come to it from an impaired nerve cell. Consequently the normal afferent impulses do not pass up to the nerve cell, because the muscular action which originates them is absent, and the whole reflex apparatus by which the spinal nerve cell and muscle react on each other to their mutual benefit is put out of gear . . . . . . Recovery of muscular action does not take place spontaneously because the whole apparatus—nerve cell, nerve trunk and muscle—are in a state of disuse atrophy, and continue to remain so, because the muscle, from its mechanical disadvantage, cannot perform its function of contracting, which is an essential part in the circle of reflex and trophic influences."[8]

In severe cases another circle is often established, and for this tenotomy is of great service. Owing to the pull of healthy antagonistic muscles, the weakened muscles are overstretched, and the result is a lessened contractility, increased weakness, and deformity. The overstretching leads to weakness, and weakness conduces to overstretching. The muscles are thus rendered less and less able to supply the stimuli necessary for the nutrition and recovery of the central neurons.

By means of tenotomy the strong contracture of the healthy opponents is arrested. Natural muscular contractions, even though feeble, become possible and react beneficially on the central lesion Such improvement will in its turn promote muscular action.[9]

2. Various forms of clubfoot are met with in which adaptive shortening of the muscles and ligaments has led to displacement of bones and fixation in an abnormal position. Such displacement, on the principle that performance of function in a wrong position leads to deformity, produces further distortion and shortening, and so the process aggravates itself. Nature, as has been said, cannot cure clubfoot; it can only render the condition worse. With the help of tenotomy the displaced bones may be brought back to their normal position and the overstretched and weakened muscles restored to functional activity.

VII.—OSTEOTOMY.

A variety of vicious circles may be broken by osteotomy.

1. Genu valgum or knock-knee frequently starts with a rickety bending of the femur or with some subsidence of the plantar arch, as a result of which the two tibial tuberosities no longer receive an

equal weight from the femoral condyles, the outer tuberosity receiving more than its due share. This extra pressure exerted by the external condyle retards the growth of the femoral epiphysis externally, while the growth of the inner condyle is stimulated by the diminished pressure received. Moreover, when once the knee-joint is no longer at right angles to the axis of the limb the internal lateral ligament is placed at a disadvantage and stretches. This involves weakness and further mischief. Hence when once started this self-aggravating deformity makes steady progress, since the more the knee yields the greater the difference in the pressure on the two tuberosities and the greater the resulting changes.

By the operation of osteotomy the unequal level of the condyles is corrected, and the limb restored to the straight position. Knock-knee and flat-foot are often simultaneously present, each contributing to the other.

2. Flat-foot presents another example, and is generally met with in flabby individuals with a weak muscular system. The deformity frequently results from such occupations as police duty or laundry work, which involve many hours of standing, and throw great strain on the calf muscles together with the tibialis anticus and the peroneus longus. When these muscles give way, the ligaments which hold the bones together soon follow, and allow the arch of the foot to subside. The greater the subsidence the greater the strain on the tendons and ligaments, and the more they yield. Thus the process *vires acquirit eundo.*

Other injurious correlations may arise from the continual aching and pain which are associated with the flat-foot, and which may be so severe as to curtail active exercise. The sufferer in consequence tends to become obese, thus throwing further weight on the weakened arch and perpetuating the disorder. The weaker the arch the greater the accumulation of fat, and *vice versâ.*

Treatment varies with the severity of the evil. In minor cases massage, exercises, and supporting pads suffice. But when the arch has entirely collapsed, tarsectomy may be required for the purpose of restoring the arch and strengthening it by means of bony ankylosis. The most widely practised is probably Ogston's method of denuding the cartilaginous surfaces of the astragalo-scaphoid joint, and immobilizing the two bones with ivory pegs. But there are various modifications all aiming at breaking the circular reactions that perpetuate the deformity.

3. Another example of the use of osteotomy is presented by hallux valgus. In this malformation the first phalanx slips round towards the outer aspect of the metatarsal bone, thus deserting its inner aspect. As a result of this displacement the extensor proprius pollicis, going straight to its insertion, lies towards the outer side of the metatarso-phalangeal joint and thus acquires increased power of aggravating the deformity. The greater the displacement the more injurious the muscular action. By means of osteotomy, ankylosis of the metatarso-phalangeal joint may be brought about and the circle

broken.

VIII.—DECOMPRESSION.

Increased pressure in the cranial and other cavities of the body may be a self-perpetuating disorder involving grave danger to life.

1. In health, the blood-pressure in the cerebral arteries is considerably higher than the intra-cranial pressure, which is about equal to venous pressure. In cases of apoplexy, however, the effused blood may raise the intra-cranial pressure nearly up to arterial and thus cause anæmia of the vaso-motor centres. In their urgent need for blood, these centres respond by a general vaso-motor constriction, which may raise the blood-pressure from its normal level of about 120–135 mm. Hg. to 400 mm. or even more. The effect of such a rise is, at any rate temporarily, to counteract the anæmia, but the irony of the reaction thus produced is that the rise, while beneficent in purpose, is apt to prove disastrous by starting fresh hæmorrhage. A further increase of intra-cranial pressure then results, and the whole sequence is repeated.

Janeway thus alludes to the process :—

" Too great emphasis cannot be laid on the fact that the rise in blood-pressure during acute cerebral compression is absolutely essential to the preservation of life. On the other hand, where the cause of the increased intra-cranial tension is a hæmorrhage, the hypertension augments it, so that a vicious circle is established."[10]

When the hæmorrhage is copious, as frequently happens if the middle meningeal artery is ruptured, the patient would probably die from cerebral compression and arrest of respiration, were nature left to her own resources. The *circulus vitiosus* would become a *circulus necator*. But by one of the operations for decompression the effused blood is removed. The cerebral anæmia is relieved; the blood-pressure falls; the coma subsides. The various functions may almost instantly be resumed as a result of this life-saving operation.

2. Another example is presented by glaucoma, a disease which intensifies itself in a vicious circle. In a healthy eye, the intra-ocular fluid secreted by the ciliary glands passes into the posterior and thence into the anterior chamber, filters through the ligamentum pectinatum and spaces of Fontana, and escapes into the canal of Schlemm and the anterior ciliary veins, the rate of secretion and excretion being governed by a self-regulating mechanism.

In glaucoma, this mechanism is disturbed, with the result that the intra-ocular pressure rises. The probable course of events is that, under certain conditions, the filtration angle is diminished and interferes with the escape of the intra-ocular fluid. This fluid then accumulates in the vitreous, and pushes forward the lens and iris, further blocking the filtration angle and so aggravating the accumulation which caused the primary trouble. The resulting increase of intra-ocular pressure may have the gravest results. Irremediable blindness is not uncommon, while the eye may remain a source of severe and recurrent pain, involving loss of sleep and impaired health.

Happily a successful iridectomy or sclerotomy breaks the circle.

The increased intra-ocular pressure is relieved; the displaced lens and iris return to their normal position, and the self-regulating mechanism governing secretion and excretion again comes into operation.

3. Decompression may also be effected by means of venesection, and is of great value in some cases of failing heart associated with over-repletion, dilatation, and a high blood-pressure. As a result of the heart failure the medullary centres are insufficiently supplied with blood, and in response induce a general vaso-constriction which forces blood to the anæmic centres. The effect of this is to impose an extra burden on the already overtaxed heart and to aggravate its difficulties. Thus cardiac failure and bulbar anæmia act and re-act on each other. A cautious venesection may under such circumstances give immediate relief. The blood-pressure falls, the cardiac dilatation diminishes, the contractions increase in force, the viscosity of blood lessens, the dyspnœa subsides, the cyanosis is relieved. Life may often be prolonged by this treatment.

Amongst other morbid conditions with which a vicious circle is associated, and which may be relieved by decompression, are hydrocephalus, cerebro-spinal meningitis, and otitis media.

IX.—REMOVAL OF NEOPLASMS.

Many neoplasms owe their growth to reciprocally acting sequences which can only be interrupted by surgical aid.

1. Adenoids will serve as an illustration, since they are closely related ætiologically with chronic catarrh of the naso-pharynx, and in their turn perpetuate such catarrh. Crowley thus describes the process :—

" The steps in the production of the disease are simple. Whenever an infant or young child ' catches cold,' the swelling of the adenoid tissue is a necessary accompaniment of the swelling of the nasal mucous membrane. Repeated attacks of this description . . . leave the lymphatic tissue in a state of chronic inflammation. A vicious circle is set up, the child takes cold more readily than ever, and eventually the adenoid growths may become of sufficient size to cause the characteristic symptoms of obstruction."[11]

As a result of this and other circles the adenoids may attain such a size as to block the posterior nares, causing mouth-breathing and many concomitant evils. Their removal interrupts the injurious sequence and has a beneficial influence on physical and mental health.

2. Polypi, again, frequently originate in a chronic catarrh, which leads to the formation of a neoplasm, which in its turn perpetuates the catarrh.

Schrötter has called attention to this process in connection with new growths in the larynx :—

" Chronic catarrh is very frequently associated with new growths in the larynx, a vicious circle being undoubtedly present. The catarrh leads to the formation of the neoplasm and this, especially when pedunculated keeps up the catarrh."[12]

3. In other cases, new growths may give rise to a circle by causing mechanical obstruction. This not uncommonly occurs in the intestines,

as pointed out by Hook and Kanaval :—

" Strictures and growths, by a partial retention of fæces, develop a vicious circle of impaired function and partial stasis that may end in complete stasis at any time."[13]

Removal of the new growth relieves the obstruction and breaks the circle.

Amongst other examples may be mentioned enlarged tonsils, and polypi of the nose, middle ear, and other regions.

X.—LIGATION OF VESSELS.

A number of circles are associated with disease of the arteries and veins, including aneurysms and varices.

1. Aneurysm is usually caused either by weakening of the arterial coats or by strain resulting from a rise of blood-pressure. The more the arterial walls yield, the greater the tension to which they are subjected; the greater the tension, the thinner and weaker do they become. If t stands for tension, r for radius, and p for blood-pressure, the condition may be represented by the formula $t = pr$. Thus the dilatation becomes a progressive process.

When an aneurysm has burst, the resulting fall of blood-pressure stimulates the vaso-motor centre, which responds by a general vaso-motor constriction. This, again, raises the blood-pressure and thus intensifies the hæmorrhage, frequently with fatal results.

2. In the case of varicose veins, dilatation and increased tension also aggravate each other. Incompetence of the valves is a further contributing factor.

Romberg thus refers to the sequence :—

" It is often impossible to say how varicose veins originate. The venous dilatation and the anatomical changes in the walls of the vein act reciprocally on one another. Thus a vicious circle of obscure pathogenesis controls the course of events."[14]

By ligaturing the affected arteries and veins the surgeon arrests these self-aggravating conditions. The removal of piles supplies another illustration.

XI.—DRAINAGE.

Some interesting circular reactions are established by the accumulation of morbid fluids in the cavities and tissues of the body. Amongst such fluids are effusions associated with pleurisy, pericarditis, ascites and cerebro-spinal inflammation. The process of accumulation varies somewhat in different cases; pleuritic effusion will serve as an example.

1. During health there is a constant circulation of lymph into, and out of, the pleuritic cavity, carried on by means of what has been called the lymphatic pump, consisting of lymphatic vessels with their stomata and valves, and worked by means of the respiratory movements. The process is a self-regulating one, with the result that the normal pleural cavity contains no free fluid.

In disease the rate both of transudation and of absorption may

be disturbed. Greatly increased quantities of fluid may be poured out, which, by their pressure, block the superficial lymphatics and arrest the respiratory movements on which depends the working of the pump. Thus the accumulation of fluid and the arrested absorption intensify each other. These reciprocally acting factors explain why pleuritic effusions are often very persistent, especially when they become purulent. The effusion feeds itself.

By one of the various methods of draining away the effusion the surgeon breaks this circle. The pressure on the lymphatics and stomata is relieved; the respiratory movements increase in activity; the lymphatic pump starts work again.

2. Another illustration is presented by ascites, which may result from cardiac, hepatic, renal or other disorders. There are various ways in which ascites is self-aggravating. For example, the accumulation of fluid by pressure on the renal veins impedes the excretion of urine and thus perpetuates itself.

Pick and Hecht write :—

" It cannot be denied that ascites itself is a severe hindrance to circulation, forming in this way a vicious circle."[15]

By the operation of paracentesis the fluid is withdrawn, the pressure on the renal veins is relieved, the secretion of urine is promoted, and the injurious correlations are arrested.

3. Under the same heading may be discussed the surgical treatment of inflammation, when it breaks what Cohnheim calls the " pernicious *circulus vitiosus*,"[16] which so often forms a complication. The successive changes which take place in a tissue as a response to injury are (*a*) dilatation of the blood-vessels, (*b*) acceleration, followed by retardation, of the blood-stream, and (*c*) emigration of leucocytes and erythrocytes. These and the associated conditions are beneficent reactions and suffice under ordinary circumstances to repair the damage. The inflammatory process undergoes resolution, and is followed by a *restitutio ad integrum*.

When, however, the trauma is severe, graver sequelæ show themselves : the circulation may come to a complete standstill, the vessel-walls cease to be nourished, the contained blood coagulates and the surrounding tissues perish. The products of tissue death and disintegration then become sources of irritation and perpetuate the inflammation.

At the outset such a damaged tissue is invaded by crowds of leucocytes, which multiply rapidly and combine with the exudation to cause swelling and tension. By this means the circulation is further checked, nutrition suffers, and the area of necrosis may be extended.

Moreover, pyogenic cocci usually make their appearance, introduced either through a wound or derived from the blood. Many are destroyed by phagocytosis; but should their numbers be too great, or should phagocytic activity be impaired, the invaders find in the clotted blood a favourable medium for growth and proliferation. The resulting chemical products in their turn intensify the inflammatory processes.

Copious exudations of serum are poured out, and in such serum float both the dead leucocytes that have perished in the struggle with the invaders and the fresh leucocytes which are continually hastening to the field of battle.

As a result of these changes the exudations gradually change into the fluid known as pus and collect in an abscess cavity. Such pus, on the one hand, contains phagocytic cells and proteolytic enzymes which assist the damaged tissue in its struggle for repair. But, on the other hand, there are also present bacterial products which aggravate the inflammation. Moreover, the proteolytic enzymes, while useful in destroying necrosed tissues, may at the same time be injurious to injured tissues of low vitality and actually cause their liquefaction. This explains how it is that pus often causes rapid destruction of such tissues, which tissues in their turn supply nutriment to the micro-organisms and thus increase the formation of pus. Indeed, the pus acts much as if it were a dead tissue in a state of decomposition, and may cause as much irritation as would a foreign body. In other words, when once formed pus feeds itself by liquefying the tissues around it, by perpetuating the very conditions in which it originated. Thus is established one of the most important vicious circles in pathology, and, generally speaking, pus must be evacuated before recovery can take place.

When an abcess is drained a multitude of pyogenic bacteria and their chemical products are got rid of. True, many beneficent phagocytes are unavoidably lost at the same time. But these are rapidly replaced, so that the ultimate gain far outweighs the loss and the powers of repair are greatly strengthened. Thus is justified the old surgical aphorism, *ubi pus ibi evacua.*

XII.—CATHETERIZATION AND OTHER SURGICAL MEASURES.

It is not only by the use of the knife that the surgeon is able to break vicious circles; other surgical procedures effect a like result. Catheterization for prostatic retention will serve as an example.

Various circular reactions may complicate such retention. The enlarged middle lobe of the prostate may project into the bladder in such a way that the contained urethra is closed by pressure of the urine on the outside of the cone.[17] In other cases a lobe of the prostate may be forced down like a valve over the urethral orifice by the pressure of urine during micturition. The greater the effort made to evacuate the bladder the greater the obstruction, and catheterization is urgently required to break the circle.

2. The use of the stomach tube in cases of gastrectasis and gastroptosis is another example. Patients are sometimes met with in whom the dilated stomach has so sunk in the abdomen as to form a kink with the duodenum. This kink retards the escape of food through the pylorus, thus causing retention and further gastrectasis, the mechanical displacement aggravating the disorder to which it was due. If the retained ingesta are washed out with the help of a stomach tube, the ptosis is relieved; the pyloric kink is abolished,

and the retention of the ingesta ceases.

3. Saline injections into the veins by means of a canula have greatly lowered the death-rate from cholera. In this disease the profuse alvine evacuations sometimes deprive the blood of more than half its liquid constituents, such loss being accompanied by a dangerous fall of blood-pressure. This low pressure, combined with the increased viscosity and the swollen renal epithelium, leads to anuria and thus to an accumulation of toxins, which then in their turn perpetuate the disease. The anhydræmia and anuria reciprocally aid and abet one another.

By the use of isotonic injections the blood-pressure may again be raised to somewhere about normal. The kidneys resume their functional activity, and a rapid excretion of toxins takes place. The death-rate has been reduced from 70 to about 20 per cent. by this treatment.

The application of an elastic bandage for varicose veins, of a pessary for a retroverted uterus, of a belt for visceroptosis, of a concave lens for myopia, of irons for flat-foot, are other illustrations of surgical procedures that arrest circular reactions.

This brief survey of the breaking of vicious circles by surgery must be looked upon as suggestive rather than as comprehensive. Further illustrations will occur to every well-informed practitioner.

Many of the disorders referred to are of the gravest importance and threaten early death unless relief is forthcoming. In the face of such emergencies the *vis medicatrix naturæ* is usually helpless. Nor are the *pills and potions* of the physician of much service. But, happily, as Hippocrates said centuries ago :—

<div style="text-align:center">

Ὁκόσα φάρμακα οὐκ ἰῆται, σίδηρος ἰῆται.

" What drugs will not cure, steel cures."[18]

</div>

All honour is to the surgeon who can break the circle at the *locus minoris resistentiæ !* Without his aid it would be true of many sufferers *pax illis cum morte solum.*

REFERENCES.

1 Sophocles : *Ajax*, 581. **2** THE PRACTITIONER, 1910, I., p. 790. **3** W. J. Mayo : *Lancet*, 1916, II., p. 889. **4** J. J. Evans : *British Med. J.*, 1907, I., p. 420. **5** These various circles are discussed in *Vicious Circles in Disease*, chapter viii. **6** *Text-book of Pathology*, p. 392. **7** *Contributions to Abdominal Surgery*, p. 5. **8** *British Med. Jour.*, 1914, I., p. 1166. **9** A good account of the " vicious reflex circle " in spastic paralysis is given by Tubby and Jones in *Modern Methods in the Surgery of Paralyses*, p. 215. **10** Janeway : *Clinical Study of Blood-Pressure*, pp. 142, 249. **11** *The Hygiene of School Life*, p. 38. Other circles associated with adenoids are described in *Vicious Circles in Disease*, p. 158. **12** *Vorlesungen über die Krankheiten des Kehlkopfes*, p. 66. **13** Keen : *Surgery*, IV., p. 654. **14** Romberg : *Krankheiten des Herzens und der Blutgefässe*, p. 496. **15** *Clinical Symptomatology*, p. 561. **16** Cohnheim : *General Pathology*, I., p. 339. **17** A diagram illustrating this condition is given in THE PRACTITIONER, 1905, II., p. 305. **18** Aphorisms, viii., 6.

Practical Notes.

MASSAGE FOR GONORRHŒAL EPIDIDYMITIS.

Neulliès points out that though there are many methods of treatment of this affection, none of them can be said to be thoroughly satisfactory, and do not shorten its course to any extent. Massage of the testis was tried before the war, and he and two colleagues, at a venereal centre have obtained most satisfactory results from using it systematically in these cases. The object in view is to bring about the complete absorption of the inflammatory exudation which has taken place into the epididymis, and at times into the cord. It is only adopted when all the acute inflammatory symptoms of the first few days have subsided.

When a patient arrives at the centre, he is sent to bed at once, put on milk diet, and has the scrotum well supported. After five or six days, when the epididymis is less painful, the treatment by massage is begun. The patient lies on his back with his legs slightly flexed and separated, the scrotum is well dusted with talc powder, and the testicle is grasped with the left hand. Slow movements of pressure are then made on the body of the testicle in such a way as not to provoke any sharp pain, and are continued for four or five minutes. The gland is felt to become slightly softer, whereupon the epididymis is seized between the finger and thumb of the right hand, the remaining fingers being placed under the testicle. By using effleurage at first and eventually firmer and firmer pressure, the epididymis is emptied by degrees. This occupies about a quarter of an hour, or a little less. The patient then passes water and the urethra is well washed out with a 1 in 4,000 solution of oxycyanide of mercury.

The effect of the massage is that although painful at first it brings about considerable relief of the pain, with a feeling of well-being generally, and a decrease in the size of the swollen organ. The treatment is repeated daily, except in the very exceptional cases in which a definite relapse of the epididymitis is set up. Complete recovery is obtained on the average in from a fortnight to three weeks, and the epididymis is left quite free from the induration so often remaining under other treatment. The patients themselves become eager for the treatment, finding great relief from the pain and great improvement in their general condition.—(*Journ. de Méd. et de Chir. prat.*, July 10, 1918.)

LOCAL TREATMENT OF PRURITUS.

In the second edition of his *Précis de Dermatologi*, Darier devotes particular attention to the local treatment of pruritus. *Lotions* are, as a rule, the more effective the hotter they are used, but some act better when warm or even cold. *Baths* cannot often be tolerated, but the following are sometimes ordered : baths of starch or of bran, with the addition of a litre of vinegar, or containing a kilo of lime-tree flowers; gelatine baths, containing 250 and 500 g. of gelatine, which is first softened in cold water, dissolved by heating and then poured into the bath.

The following are applied by swabbing over the surface : spirits of camphor (10 per cent.) or camphor in brandy (1 in 40); camphorated oil of camomile (1 in 20); resorcin, 2 to 5 per cent. in alcohol; menthol, 1 to 2 per cent. in alcohol or in liquid paraffin; glycerine of carbolic acid; alcoholic solutions of nitrate of silver (5 to 10 per cent.); and lemon juice. Of special use are alcoholic solutions of thymol (1 in 200), and of carbolic acid (1 per cent.), coal-tar emulsion (5 to 10 per cent.), to which is added from 5 to 10 per cent. of castor oil or glycerine in order to prevent too rapid drying, and the application is covered with powder. The following solutions,

applied by swabbing, are recommended :—

(1) Glycerine - - - - - - 50 g.
Vinegar,
Camphorated spirit,
Aq. Laurocerasi - - - - - of each 100 g.

For use, this is diluted with from 4 to 10 parts of hot water.

(2) Cocaine hydrochloride,
Chloral hydrate,
Resorcin - - - - - of each 1 g.
Glycerine - - - - - - 5 g.
Alcohol - - - - - - - 20 g.
Aq. Laurocerasi - - - - - - 30 g.
Water - - - - - - - 44 g.

Ointments sometimes afford considerable relief. Pure lard, pure vaseline, or a simple salve will sometimes be sufficient; but, as a rule, it is better to use sapolan, naphthalan, or pure cod-liver oil made up into ointment, or preferably in collosol form. With ointments or pastes it is often of great advantage to add antipruriginous substances. Tartaric acid (5 per cent.) in glycerine of starch, or menthol 1, chloroform 2·5, and camphorated oil of camomile 100. Anesthésine in lanolin cream (10 to 30 per cent.) with the addition of alcohol or of olive oil (10 to 30 per cent.).

A useful ointment is composed of :—

Menthol - - - - - - - 1 g.
Chloral hydrate,
Camphor (in powder) - - - - of each 5 g.
Lanoline - - - - - - 35 g.
Vaseline - - - - - - - 50 g.

If a paste is more suited for application, the following is recommended :—

Menthol - - - - - - - 0·50 g.
Phenol - - - - - - - 1 g.
Salicylic acid - - - - - - 2 g.
Puménol - - - - - - - 5 g.
Lassar's zinc paste - - - - - 90 g.

Cod-liver oil ointment—

Cod-liver oil - - - - - - 5 to 30 g.
White oil - - - - - - 5 to 25 g.
White wax - - - - - - 5 g.
Paraffin - - - - - - - 8 g.
Aq. Rosæ,
Aq. Laurocerasi - - - - - of each 10 g.

After application to be powdered over with talc.

Sheltering the affected surface from the air is sometimes a most effective method of treatment. Ointments and paste probably act in this way to a great extent. For the purpose zinc pastes are most practicable, being applicable over large extents of surface—

Gelatine,
Zinc oxide - - - - - of each 15 g.
Glycerine - - - - - - 25 g.
Water - - - - - - - 55 g.

The mass is liquefied in a *bain-marie*, and applied with a camel's hair brush. A layer of absorbent wool is then applied. Ichthyol and other active bodies may be incorporated, but it is better to apply them over the surface, and then to cover up with the paste.—(*J. de Méd. et de Chir. prat.*, Aug. 10, 1918.)

Reviews of Books.

A Manual of Physics. By HUGH C. H. CANDY, B.A., B.Sc. Second edition. Pp. 451. London : Cassell & Co. 7s. 6d. net.

THIS useful volume, which is a companion to the " Manual of Chemistry " published by the same firm, has now reached a second edition. The two books most admirably furnish the theoretical and practical information for the first examination in physics and chemistry. The text has been revised and considerably extended, particularly in regard to the therapeutic applications of radiant heat, light, and electricity. A large number of written and practical exercises have been incorporated in the book and these provide good practice in the working out of numerical problems and in performing physical experiments. There are nearly 300 figures in the text and a number of useful tables. The book, we are sure, will thoroughly fulfil the purpose for which it was written. It is well printed, and excellently bound in the red cloth for which the publishers have become quite noted.

Diseases of the Nervous System. By SMITH ELY JELLIFFE, M.D., Ph.D., and WILLIAM A. WHITE, M.D. Second edition. Pp. 938. Philadelphia : Lea and Febiger. $7.

WANT of space will not permit a book of this size to be reviewed in detail, but it may be said at once that it is an excellent book and that this edition has been brought fully up to date. Among the subjects to which particular reference may be made are those included under Part I., which comprise an account of the autonomic and sympathetic nervous systems and the internal secretions, of which a useful description, with excellent illustrations, is given. The illustrations throughout the whole book are both numerous and explanatory, and will afford great assistance to readers of this subject, to whom the book can be strongly recommended.

Dysentery, Asiatic Cholera, and Exanthematic Typhus. By H. VINCENT (French Army) and L. MURATET (Bordeaux). With an Introduction by A. Balfour, C.M.G., M.D. Edited by G. C. Low, M.D. Pp. viii + 227. London : University of London Press. 6s. net.

WITH the exception, perhaps, of the Western Front, dysentery has been the most common of the communicable diseases in the present war. Cholera has hardly been met with except in Mesopotamia, though there is always the risk of its appearance during a campaign. Typhus fever has been practically unknown among the British forces, but has devastated some of the prisoners' camps. These three diseases are, however, notoriously associated with war and its consequence, famine, and the appearance of this manual is therefore opportune. A good account is given of the ætiology, symptoms, diagnosis, and prophylaxis of the three diseases and the editorial notes contributed by Dr. Low are valuable and to the point. Treatment seems to be the weakest part of the book, and it ought to be expanded in a future edition. Thus, in bacillary dysentery, serum treatment has a page devoted to it while saline treatment is dismissed in four lines. Under cholera, no details are given of the method of administering hypertonic saline, nor is the dose or frequency of administration of potassium permanganate mentioned. The prophylaxis of each disease is well treated, and the statistical data included should be very useful The book is well printed and very readable.

AN ADDRESS ON THE SYMPTOMS WHICH PRECEDE AND ARE ASSOCIATED WITH GENERAL ARTERIO-SCLEROSIS.*

By O. K. WILLIAMSON, M.A., M.D., F.R.C.P.

Physician, City of London Hospital for Diseases of the Chest, Victoria Park ; late Assistant Physician, Westminster Hospital, etc.

I SHALL here deal only with the variety of arterio-sclerosis associated with high arterial blood-pressure, the hyperpietic form of Sir Clifford Allbutt, recognizing as I do that the classification of these cases by that most eminent authority is by far the most satisfactory of any which has, so far as I am aware, been suggested.

THE PATHOGENESIS OF HYPERPIETIC ARTERIO-SCLEROSIS.

The mode of production may profitably be considered first; for if, as I shall endeavour to show, the process is the direct result of high arterial blood-pressure, it follows that the recognition of that symptom and its effective treatment means far more than dealing with a symptom of a pathological process which is already established, but may reasonably be considered as a means of prevention of the ensuing consequences. It has been shown by more than one observer that a clinical picture characterized by high arterial blood-pressure and attendant symptoms may occur, often in one or in recurring attacks, which may pass off perhaps as the result of treatment, and that there may be complete restoration to health. Again, other such attacks if neglected become less and less amenable to therapeutic measures, and finally incurable and associated with obvious signs of arterio-sclerosis. These facts show that high arterial blood-pressure is, at any rate, one of the earliest signs of arterio-sclerosis; and, if not a direct cause, is, seeing that it may be made to disappear without arterio-sclerosis resulting, at any rate associated with conditions which give rise to arterio-sclerosis.

It is interesting to note in this connection that Boerhaave, in 1708, appeared to have a just appreciation of the sequence of events when he wrote : " L'impulsion contre les parois artérielles exerce sur les petits vaisseaux qui composent leurs tuniques une action telle que les compressions successives de chaque ondée sanguine finissent par retrécir ces petits vaisseaux, oblitérer leurs cavités, épaissir leurs

* Being the Annual Oration of the Hunterian Society, 1918.

parois, d'où il résulte que leurs membranes elles-mêmes deviennent plus solides, plus cartilagineuses, plus osseuses." Again, Mahomed,[1] speaking of high arterial blood-pressure, writes : " Who will or can deny that the persistence of such a condition as this must lead eventually to structural change, viz., to hypertrophy of the heart and thickening of the arteries ? "; and, speaking of Bright's Disease,[2] says : " Previous to the commencement of any kidney change, or to the appearance of albumen in the urine, the first condition observable is high tension in the arterial system "; so that this observer clearly recognized that high arterial blood-pressure precedes the clinical picture associated with renal disease and the attendant cardio-vascular changes.

Huchard,[3] with the incisive brilliancy characteristic of French authors, wrote : " L'hypertension artérielle est la cause de l'artériosclérose, elle précède pendant un temps plus ou moins long l'évolution de diverses maladies (cardiopathies et néphrites artérielles, etc.) lesquelles sont elles-mêmes sous la dépendance de la sclérose vasculaire. Donc, les faits se succèdent dans l'ordre suivant : spasme artériocapillaire, hypertension artérielle, sclérose artérielle, sclérose viscérale." He brings forward cases bearing on this hypothesis—cases showing signs and symptoms of high blood-pressure—some of which progressed to definite arterio-sclerosis ; others in which, as the result of treatment, the symptoms definitely disappeared.

It would appear that this great clinician has hardly received in this country his due meed of recognition for these highly important observations. Our equally distinguished authority, Clifford Allbutt,[4] shares with him the credit for recognizing in 1893–4 that high blood-pressure precedes the actual arterial changes. I would, therefore, merely remind you that he describes an insidious rise of arterial blood-pressure—hyperpiesia, as he names it—which occurs in middle or late middle life, which if treated becomes cured, or at any rate recurs with less persistence ; but, on the other hand, if neglected tends to recur, to progress, and ultimately to become associated with arteriosclerotic changes. It is generally recognized that in hyperpiesia the increased resistance to the blood-flow is associated with a contraction of the muscular coat of the medium and smaller arteries, causing a diminution of their lumen, a condition called by W. Russell arterial hypertonic contraction ; indeed, not only is the radial pulse small and hard in such cases, evidently associated with a contracted artery, but other accessible medium-sized arteries may often be felt to be distinctly contracted below their normal size. The ultimate causes of this contraction it is foreign to our purpose to pursue. That a condition exists characterized by high arterial blood-pressure and its accompanying clinical features which, if continued, becomes associated with hypertrophy (so-called arterial hypermyotrophy) of the muscular coat of the medium and smaller arteries, has been shown by Savill,[5] this observer describing cases together with post-mortem findings. Many of these cases undoubtedly fall into line with Allbutt's cases of hyperpiesia ; others are definitely associated with

chronic interstitial nephritis.

It would seem that the only satisfactory conception of the pathogenesis of hyperpietic arterio-sclerosis, although suggested by Huchard, was first brought forward by Russell; yet this author fails to distinguish between this form and the variety unattended by high blood-pressure, a distinction insisted upon by Allbutt. Briefly stated, Russell's explanation is that toxic substances (Huchard's muscular excitants) cause a hypertonic contraction of arterioles and of those arteries which vary in size from at least as large as the brachial downwards, that an increase of pressure in the aorta —that is, behind the constricted area—is thus caused, and which, if recurring or continuous, leads to hypertrophy of the muscular coat of the arteries.[6] He lays stress upon the fact that the maintenance of the blood-pressure depends upon the power of the left ventricle and, as he reminds us, such hypertrophy of the muscular wall of the arteries has been shown by Sir George Johnson, Savill, and himself. He states the undeniable truth that " Mere contraction of vessels does not lead to hypertrophy, but does so if long continued and if the blood-pressure be fairly maintained. . . . When hypertonus persists, it must lead to hypertrophy, hypertrophy being the normal result of such a condition." He found from his histological observations on such thickened vessels that, when the condition is permanently established, not only is there thickening of the media but also thickening of the intima, and sometimes of the adventitia, and considers that the thickening of the intima is the result of a long-continued irritation of its tissue by substances present in the blood.

E. H. Colbeck, in a closely reasoned paper in THE PRACTITIONER,[7] considers " that the morbid changes in arterio-sclerosis represent stages in the operation of a single pathogenetic process, which commences with increase of function and consequent hypertrophy of the arterial muscular coat, progresses by way of failure of functional efficiency with degeneration of the muscular substance, and culminates in hyperplasia of the fibrous tissue elements of the arterial wall." Thus, he agrees with Russell, in so far as he says that the morbid changes in arterio-sclerosis commence " with increase of function and consequent hypertrophy of the arterial muscular coat." It should be noted that he applies his theory not only to the cases of arterio-sclerosis associated with high blood-pressure, but also to those which are not, and that he alone of writers on the origin of arterio-sclerosis recognizes Allbutt's distinction.

I will here refer to certain observations which seem to prove that in hyperpietic arterio-sclerosis not only is the occurrence of the arterial change of later date than the rise of blood-pressure, but must be directly attributable to that rise of blood-pressure.

In describing his cases of hypermyotrophy already alluded to, Savill states that " The media of the arteries of the lower extremity were nearly always more hypertrophied (or presented a more advanced stage of degeneration) than those of the upper extremities . . . The

major distribution in the lower extremities suggests the explanation that gravity throws more strain upon these latter."

Further, I pointed out[8] in speaking of the higher systolic blood-pressure readings in the legs than those in the arms in hyperpietic cases of arterio-sclerosis, when both readings were taken at the level of the heart, that such higher readings can only be explained by increased resistance of the leg vessels as compared with those of the arms, and that " The conclusion that the abnormal condition of the arterial wall is a direct result of the increased blood-pressure would seem to be inevitable, for the only obvious differences between the conditions to which the arteries of the lower extremities and those to which the arteries of the arms are exposed in daily life is that the former are subjected to greater hydrostatic pressure from a higher column of blood than are the latter."

On the other hand, I showed that such a difference between the arm and leg readings did not obtain in cases of normal or low blood-pressure.

A few words are desirable about a theory of arterio-sclerosis which I cannot but think has retained an undeservedly prominent place in medical literature.

R. Thoma,[9] as the result of extremely detailed and painstaking research on the fœtal arteries and on arteries in pathological cases, some of them arterio-sclerosis, formulated conclusions as to the pathogenesis of arterio-sclerosis. He investigated microscopically the wall of the abdominal aorta between the points of origin of the umbilical arteries and the ductus vitelli before and at different periods after birth, basing his arguments on the fact that after birth, when the placental circulation is cut off, there must necessarily be an increased blood-pressure in the abdominal aorta. He argued that, in consequence of this increased pressure, the portion of the aorta in question becomes dilated, and that associated with this is a weakening of the middle coat, that in consequence of the ensuing slowing of the stream, and to compensate for it, a deposition of fibrous material takes place in the subendothelial layer of the inner coat so as to reduce the lumen of the vessel to its previous calibre. As a result of his investigations he explained the changes which are met with in arterio-sclerosis. The arterial changes met with in chronic renal disease are explained by him thus : owing to destruction of part of the capillary circulation and other causes, there ensues an increased resistance to the blood-stream ; in consequence, compared to the capillary circulation, the arteries of the kidney become relatively widened, and the result is that the intima of these and their twigs become thickened by newly formed tissue in the same manner as the wall of the aorta after the cutting off of the placental circulation. He says : " Gleichzeitig mit dem ersten Auftreten der bindgewebigen Verdickungen und Verfettungen in der Intima einzelner Gefässprovinzen findet man in andern Gefässabschnitten eine Verminderung der Elasticität und Schwächung der Wand ehe es zur Entwickelung anatomisch nachweisbarer Veränderung kommt. Die Schwächung der Gefässwand nimmt zu, während

an art und stelle die ersten Spuren der Bindgewebigen Verdickung der Intima auftreten, und in diesem Stadium der Erkrankung ist die Gefahr der Bildung arteriosklerotischer Aneurysmen am grössten. Mit diesen Ergebnissen bestätigt sich endlich die Behauptung . . . dass die Ursache der primären Arteriosklerose zu suchen sei in einer primären Schwächung der Gefässwand."

Allbutt[10] criticizes the theory that the hyperplasia of the intima is compensatory, pointing out that " most of us hold not that structures in their changes are beckoned for their good hither and thither by an ally in advance, or even by a stream of intention, but depend for their survival upon such power of reserve and readaptation as they may have inherited or acquired."

Colbeck[11] rightly points out that " in a large proportion of cases of arterio-sclerosis, clinical experience distinctly negatives any initial weakening of the media and consequential dilatation of the vessels." It seems certain that Thoma's hypothesis as an explanation of the pathogenesis of hyperpietic arterio-sclerosis, to which it is clearly intended to apply (he fails to distinguish between the different varieties of arterio-sclerosis), is directly opposed to clinical facts. We have seen that the essential conditions, which precede the development of the sclerosis, are high blood-pressure, accompanied by hypertonic contraction, and subsequent hypertrophy of the small and medium-sized arteries, the most essential feature being hypertonic contraction ; but Thoma expressly postulates a primary weakening and a dilatation of the vessel wall as preceding the development of the sclerosis.

It follows that his theory, whether or not applicable to explain changes in the arteries behind (that is proximal to) the constricted area, which ensue after and are secondary to the arterio-sclerotic process, is quite inadequate to account for those in the constricted area itself, where in the medium-sized and smaller arteries the most definite, the earliest, and, indeed, the essential changes take place.

It is unnecessary to do more than refer to the views of such distinguished observers as Potain and von Basch, which are, briefly speaking, that the sclerosis precedes and does not follow the development of the high blood-pressure, for these are opposed to what we have seen to be the order of the development of the events.

SYMPTOMS OF HYPERPIESIA.

The first of these to consider is the rise of arterial blood-pressure. Until comparatively recent years, the most reliable method of judging of a rise of blood-pressure was by the finger. It is said that Sénac, in 1749, described well the character of the hard pulse.

THE PULSE OF HIGH ARTERIAL PRESSURE.

Its features are thus admirably described by Mahomed :[12]

" The pulse of high pressure may have three qualities : it may be long, persistent, and hard . . . A long pulse means a labouring heart, and is in conformity with the rule given by Marey, that the length of

the ventricular systole is in direct proportion to the arterial resistance (or pressure). The pulse is called persistent when the arteries are constantly full . . . the vessel can still be recognised by the finger, both during systole and diastole, it is always there, we never lose it . . . The least constant character of the high pressure pulse is that of hardness or incompressibility. This form of pulse is recognized by its undue length and latent pushing character, which is not at first apparent; it requires firm compression of the vessel for some little time before it becomes evident."

The pulse of high arterial pressure may be either small or large; in the early stages it is more often small, seeing that the condition is associated with hypertonic contraction, and its very smallness may tend, we shall see, to deceive the observer who relies only on digital examination. The associated arterial contraction, and consequent thickening of the arterial wall and diminution in diameter of the lumen causes the artery to be palpable, a fact emphasized by Russell, and such an artery, if the possibility of this condition is not recognized, will be mistaken for a permanently thickened one. The distinction will, of course, be made by the fact that in the case we are considering when, as the result of treatment or for other reasons, the spasm passes off, the thickening will disappear.

Besides the character of the pulse, in virtue of which more force than usual is necessary to obliterate it, another characteristic exists. On gradually exercising with the finger an increasing degree of force, it will be found that the amplitude of pulsation or size of the pulse increases up to a point from which further degrees of pressure cause it to diminish.

The pulse-rate may be slow, or it may be considerably quickened. As Allbutt says, Marey's rule of the inverse relationship between pulse-rate and blood-pressure is often overridden by other factors.

THE SPHYGMOGRAPH.

In regard to the use of the sphygmograph, Mahomed thus enumerates the characteristic features of the pulse of high tension :—

1. A pressure above one ounce, and sometimes as high as ten ounces, is employed to develop the pulse tracing to its greatest extent.
2. The percussion wave is usually well marked, and distinctly separated from the tidal.
3. The dicrotic wave is very small, and often scarcely perceptible; the vessels, however, are full during the diastolic period, and collapse slowly.
4. The tidal wave is prolonged and too much sustained . . .

The most constant of these indications is the prolongation of the tidal wave.[13]

In addition, it may be pointed out that the descending limb (as implied by Mahomed) and, in rare cases, the ascending limb, are

oblique, and the height of the curve is generally low, except when the high pressure is due, not to increased resistance alone, but to a strong full systole as well.[14]

Of course, the sphygmograph does not measure the arterial pressure. Another point is that anacrotism is not infrequent. It may be stated that this instrument has not fulfilled the hopes once entertained with regard to it as an aid to diagnosis, although in skilled hands it is useful for recording results of treatment.

INSTRUMENTS FOR MEASURING BLOOD-PRESSURE.

Von Basch and subsequent observers introduced instruments of precision for measuring blood-pressure. Those first devised were, however, unsatisfactory. The most generally satisfactory method of reading arterial pressure has been found to be that by which the limb is compressed by means of the inflation of a hollow band around it so as to obliterate the artery, the pressure at which pulsation just ceases in the artery distal to the band being noted (for systolic reading) by a manometer.

This method was devised in Italy by Riva-Rocci, and in this country by Leonard Hill at practically the same time (1896-7). The most experienced observers in this branch of clinical medicine have reached the conclusion that estimation of the blood-pressure by the finger, especially in cases of high blood-pressure, is liable to be misleading, the reason being that the impression of the degree of pressure conveyed by the finger is in proportion to the total pressure, which is dependent on the size of the artery at the point compressed, and not in proportion to the pressure per unit area, which is what we require to measure. It is true that the well-trained finger will obtain information about the artery out of reach of the instrument, and that the instrumental indications of pressure in certain cases of arteriosclerosis associated with high blood-pressure are fallacious, but the latter objection does not obtain in considering the use of the instrument for our present purposes. The use of the finger should be supplemented by judicious instrumental examination ; a rise of systolic pressure above the normal, if not accounted for by physiological causes, should excite suspicion of hyperpiesia. A reading above 145 mm., if the patient is below 40 years of age, may be considered pathological, or above 160 mm. if he is over that age ; it being borne in mind, as Dr. George Oliver has pointed out, that the figure should be verified by repetition, not only on one, but on more than one occasion.

It is necessary to emphasize the importance that persons of and beyond middle age should have their blood-pressure measured at intervals, in order that the early development of hyperpiesia may be detected and that arterio-sclerosis may thus be prevented.

Although we have considered only the question of systolic pressure, it is possible that a rise of diastolic pressure may, in exceptional cases, be found to occur before the systolic elevation.

It has been observed that hyperpietic patients are more liable than others to critical excesses of blood-pressure. This has been pointed

out by Pal, Janeway, and others.

We must now consider other symptoms of hyperpiesia, many of which will be seen to be simply those of a toxæmia.

There may be a heaviness or oppressive fulness in the head, or an actual headache. This headache may be pulsatile in character. Drowsiness, insomnia, fatigue—especially in the morning—sometimes occur, or inaptitude for work and inability to concentrate the attention ; this inaptitude, perhaps, alternating with a mild psychic exaltation, cerebral confusion, despondency, giddiness (especially in the morning), failure of memory, noises in the ears, migrainous or neuralgic attacks, nervousness.

Huchard[15] gives the following symptoms : Local areas of coldness, coldness which may be limited to the lower limbs, to a segment of the limb, to the knees, sometimes to the upper extremities, more rarely to half the body.

Again, there may be local syncope of the extremities, " rheumatic " pains and cramps in the limbs, with a sensation of local fatigue or of weight, vague pains, paroxysmal pallor of the integuments (especially of the face). A tendency to hæmorrhage may be evident, thus hæmoptysis or epistaxis may occur, and this epistaxis may be the first symptom ; there may be a tendency to dyspnœa, especially on exertion, to intermittent polyuria. Some of the cases of hæmoptysis have manifestations of rheumatism or fibrous rheumatism. The dyspnœa is accompanied at times by a sensation of vague pain in the chest and anxiety, sometimes nocturnal, in occurrence. There may be palpitation, often accompanied with a vague sensation of præcordial fulness.

Haig says that there may be an excess of uric acid in the urine. It is said that a flatulent stomach may be an early symptom of hyperpiesia.[16]

Finally, it may be mentioned that certain symptoms best accounted for by the conception of arterial spasm may occur, but it will be most convenient to deal with these when we come to consider the symptoms associated with actual arterio-sclerosis.

Although we cannot hope to effect a *restitutio ad integrum* of the damaged arteries, yet by diagnosis and judicious treatment much may be done to prevent the development of the condition, or, if it be more or less localized, to prevent its involving other parts of the arterial system.

The general nutrition is usually good ; there is often a tendency to fatness, though some patients are thin. Allbutt says that the countenance is healthy or too florid, or there may be a sallowish ground tint with a splash of ruddiness upon the malar eminences.

In addition to the qualities of the pulse already detailed, it may

be pointed out that the pulse may show an extra systole now and then (Mackenzie) or more frequently. There may be paroxysmal tachycardia; Mackenzie[17] finds that the extra systoles are usually of ventricular origin. The extra systoles may occur at every second beat, in which case the condition must be distinguished from pulsus alternans. The diagnosis between these conditions can be made by reducing the arterial pressure by nitrite, when in high pressure cases the pulse becomes regular. Under high pressure whilst before disease has occurred fatigue of contractivity sets in, true pulsus alternans may appear, under high pressure also there may be a string of premature rhythms of the pulse; and, on reduction of the pressures to normal, regular rhythm may return. You may also get in high pressure cases bigeminal, triplet, and other curiosities of rhythm. There may be shortness of breath or a sense of substernal constriction; the patient, too, may be sensible of the heart's action at night, especially when lying upon the left side, or there may be an uneasy aching about the heart. The heart usually shows the signs of hypertrophy, the apex beat being displaced downwards and outwards, and the impulse forcible and heaving in character. The first sound is prolonged. This fact was observed by Sibson. There may be a *bruit de galop.* The second aortic sound is accentuated. Allbutt points out that the accentuated aortic second sound may be due not to increased aortic pressure, but to atherosclerotic changes in and about the parts at normal pressure. On the other hand, the hypertrophy may have given way to dilatation. The subcutaneous veins may then be swollen, there is slight œdema of the shins, crepitations or harsh and prolonged breathing at the pulmonary bases, where the percussion note is a little muffled. Thoma points out that œdema arises in association with sclerosis of arteries and veins; it may be a transient shifting œdema of feet or eyelids, according to position. Symptoms of angina pectoris may occur.

NERVOUS AND MENTAL SYMPTOMS.

As Mott[18] points out, the nervous system, or parts of it, may suffer from partial or complete ischæmia, and the symptoms are due to circulatory disturbances.

The patient, if naturally energetic, is found to have of late lost his elasticity, to have become more sluggish, fretful, and despondent, especially early in the day, cheering up towards evening[19]; not only so, but there may be exhaustion following mental or physical exertion. Disturbances of sleep are common, sleep may be uneasy and less refreshing than formerly, drowsiness occurs, also apathy, and torpor is a common symptom. Allbutt considers that torpor and drowsiness are apt to occur in the daytime. The patient is apt to be unusually susceptible to the action of alcohol and tobacco, which excite and aggravate many of the cerebal troubles;[20] he may, moreover, become more and more tempted to rouse himself with wine. Irritability of temper may occur. The high blood-pressure may produce a sense of energy, or even an increased activity. Grave obsession may occur.

There may be attacks of maniacal excitement or depression; these

are accompanied not infrequently by hallucinations or delusions, so that, as Mott points out, it is not unusual, especially if the patient suffers with slight apoplectic or epileptiform seizures followed by a transient hemiplegia and a progressive dementia, to look upon the case as one of general paralysis. As a rule, these delusions relate to persecution rather than grandeur and exaltation, and the dementia is not nearly so pronounced as in general paralysis; moreover, paralysis when it occurs, is usually coarse. The attacks of maniacal excitement or depression are especially liable to occur in persons of insane temperament (Mott). A melancholia may occur amounting to insanity. This condition is, according to Allbutt, usually a phase rather than an abiding derangement. Insanity, however, is not very common.

Pseudo-bulbar or true bulbar paralysis, with spasmodic laughing and crying, is described, also progressive muscular paralysis with fibrillar twitching. There may be Cheyne Stokes breathing at intervals or habitually for months. Vertigo is a common symptom; it occurs especially when a sudden change is made from the recumbent to the upright position. Mott says that in its slight form it may not amount to more than a lack of the feeling of stable equilibrium, often increased by apprehension, and not infrequently associated with tinnitus. Vertigo of labyrinthine origin and the syndrome of Ménière's disease may occur. There seems to be some relationship between blood-pressure and the size of the pupil, in that rises of pressure may narrow the pupil.

LOCALIZED ARTERIAL SPASM.

We now come to certain clinical phenomena, which, I believe, are the expressions of localized constriction of the arterial branch or branches supplying the affected area, or, as Russell describes them, arterial spasm. Such phenomena occur in other parts of the body besides the central nervous system, in fact, in every part of the body, so that it will be best now to glance briefly at the whole subject.

That transient attacks of general arterial constriction associated with hypertension may occur has been pointed out by many observers, and is now generally recognized. Lauder Brunton made in 1867 the classical discovery that dilatation of the peripheral vessels by means of amyl nitrite relieved the symptoms of angina pectoris. The general attacks, as well as localized ones, were called by Pal vascular crises (Prof. Pal, *Gefässkrisen*, Leipzig, 1905), and are spoken of by Russell as hypertonic contraction.

In regard to localized constriction, Charcot, in 1858, observed the following facts in the horse :—[21]

" The horse, as a result of the narrowing of the lumen of the abdominal aorta, or of a large artery of one of the hind limbs, may exhibit signs of intermittent claudication. The animal, while at rest, or even when trotting at a moderate pace, shows no signs, but the blood supply is insufficient to permit it to continue any rapid trot, and it soon goes lame, drags the limb, and sometimes falls without being able to get up again for some time. The limb is found to be cold

and without appreciable arterial pulsation."

The most reasonable explanation of such phenomena is that a temporary spasm of the muscular coat of the affected artery takes place, occluding its lumen and causing a corresponding temporary ischæmia and loss of function of the part supplied.

In man, when the arteries of the limbs are affected by disease, you may get formication pains and abnormal sensations in the limbs. Pain in the calves, soles of the feet, around the nails, cramps, coldness and pallor of the extremities, up to intermittent claudication, form together a sign of importance.[22] Thus, intermittent claudication may occur in man,[23] as shown by François, Charcot, and Sabourin.

It occurs in cases of chronic arteritis. When at rest no inconvenience is experienced by the patient, but after walking pain and feebleness ensue, and if walking be continued, the pain and cramp in the limb compel inactivity. On examination, the limb is found to be cold and bloodless, it is either pale or has a blue marbled appearance. Sensibility is blunted. The arterial pulsation in the posterior tibial and dorsalis pedis is diminished or abolished.

The symptoms are the same as those which I shall allude to subsequently, and which were described by Déjerine as " claudication intermittente de la moelle épinière," with certain differences to be mentioned. Intermittent claudication is the forerunner of senile gangrene. When signs of it appear, gangrene usually ensues within a few years. The nose, the tips of the ears, and the upper limbs, and, it is said, the penis may be thus affected.

That localized spasm in superficial arteries may occur is, I think, obvious from cases such as the two following ones :—

A woman aged 35 years came to me on account of pains in the temporal region and vertex of the head, and in the limbs, as well as of " noises in her head." The radial artery gave the impression of being contracted. The blood-pressure instrument gave a reading of 115 mm. (systolic). She was somewhat pale. Iodide of potassium in 5-gr. doses, thrice daily, was ordered. A week later the blood-pressure was 110 mm., she felt better, and the contraction of the radial was no longer observed.

I record this case merely as an instance of a condition of spasm which passed off, probably as the result of treatment :—

In a man 73 years old, having decided thickening and tortuosity of his superficial arteries, I took a series of simultaneous blood-pressure readings on the right arm and right leg by a modification of the Riva Rocci method, each armlet being connected with the same manometer by means of a T-piece, and the patient being in the recumbent position. One reading gave 145 mm. for the arm, 189 mm. for the leg, a difference of 44 mm.; a later one showed 132 mm. and 145 mm. respectively a difference of 13 mm.; whilst, still later, the arm yielded a reading of 140 mm., the leg one of 205 mm., a preponderance of 65 mm. in favour of the leg.

It would be difficult to account for this pronounced rise in the reading of the leg compared to that in the arm by any hypothesis other than by what I think is the obvious one, viz., that there occurred a considerable spasm of the muscular coat of the leg vessel

at the site of compression—a spasm out of all proportion to any which took place in the arm.

Seeing that the cerebral arteries are, like those of the systemic and splanchnic systems, possessed of a muscular coat, and that it is now granted by physiologists that they possess vaso-motor nerves, and further, that arteries have been shown experimentally to contract as a result of the direct action of substances circulating in the blood without the influence of the nervous system,[24] it is reasonable to suppose that arterial spasm will affect them like other arteries of the body. The presumption, indeed, that it does so, and which I will now indicate, seems to be strong.

As regards the retinal vessels, Noyes records a case in which the patient became totally blind in about ten minutes and remained so for about 16 hours; 24 hours after the beginning of the attack, he had only dim perception of objects. The arteries were found, ophthalmoscopically, very much contracted. After treatment by amyl nitrite the vision became normal within 20 minutes.[25]

Wagenmann[26] records the case of a gentleman of 69 years, who for two months had frequent attacks of total or partial loss of sight in the right eye lasting from some minutes to a few hours. In a total attack which was observed the retinal arteries were found to be quite empty. After 10 minutes the arteries showed a thin red line of blood, within half an hour they had resumed their normal appearance, and the sight had returned to its usual condition. For seven months there was complete immunity from attacks. R. A. Lundie[27] describes the case of a patient 88 years of age, whose left eye became quite blind, the patient having tested his two eyes separately. Within half an hour of the attack he could see a little. The upper part of the field had some perception; the lower part was quite blind. On ophthalmoscopic examination the vessels were found to be normal, except the upper main branch of the retinal artery. In this there was an interruption of the column of blood just beyond the margin of the disc, in a section of the vessel. . . .The position of this part of the vessel could be traced in a whitish streak, but it seemed entirely empty. On the proximal side the vessel was of normal calibre; on the distal side the column of blood was continuous. A dose of whisky was administered, and afterwards amyl nitrite, after which the patient could see quite well. On examination the obstructed artery was found to have recovered its normal appearance. The whole duration of the attack was somewhat less than one hour. At the time of writing there had been no recurrence of the condition, and nothing abnormal could be detected in the fundus except that the veins perhaps were a little fuller than usual.

Benson[28] records yet another case.

Allbutt, in throwing doubt upon the occurrence of retinal spasm, says, in regard to Wagenmann's case, that " the subsequent history is not given "[29], also, in discussing the cases, that " we do not hear definitely of a return of complete vision,"[30] but surely this statement must be the result of an oversight in view of the above three records. He also

speaks of thrombotic accidents as accounting for the amaurotic phases; but Lundie, in his case, definitely says that " nothing abnormal can be detected in the fundus except that the veins are perhaps a little fuller than usual."

CEREBRAL SEIZURES DUE TO ARTERIAL SPASM.

The first suggestion of arterial spasm as an explanation of cerebral seizures seems to have been made in 1886 by Dr. George Peabody.[31] He brought forward three cases, " not as something new," but as bearing upon the pathology of a condition about which little work had been done. One of these cases was published,[32] and he says, in regard to it : " The question is whether death can be caused by this lesion (*i.e.*, arterio-sclerosis), preceded by symptoms of disturbance of brain function, such as hemiplegia, aphasia, etc., without lesion of the brain. I believe that it can."

He recorded the clinical notes and autopsy of a man who had several attacks of hemiplegia and aphasia, from most of which he recovered completely, but finally died in a more severe attack. At the autopsy the cerebral arteries, especially the basilar and left middle cerebral, showed a growth of connective tissue in the wall of the intima so as to diminish the calibre of the vessels. No other change in the brain was found. In commenting upon the case, Dr. Peabody says : " It seemed to me that there might perhaps have been a spasmodic contraction of the muscular coat of the middle cerebral artery or of several of its branches, which, in addition to the encroachment upon its lumen produced by the new growth, was sufficient to cut off the blood supply to the parts to which it was distributed ; that this had occurred several times, causing each time temporary ischæmia of important brain centres; and that, in the final attack, it had lasted long enough to produce death, but that it was not complete enough or of long enough duration to cause softening." Dr. William Russell, of Edinburgh, has for many years past insisted on the fact that arterial spasm is the explanation of such cerebral seizures, and those interested in the subject will be well repaid in reading his brilliant and suggestive work.[33]

Russell classifies the cases according as they occur in patients having soft vessels or, on the other hand, in those in whom the vessels are thickened,and points out that the phenomena are of much graver significance in the latter. He cites instances under both headings, and reminds his readers that homonymous hemianopsia and temporary local paralysis may accompany an attack of migraine. He has also found that, in persons with sclerosed or atheromatous arteries, the cerebral phenomena are associated with hypertonic contraction of systemic vessels.

Edgeworth[34] describes two cases, and among other conclusions points out :—

" That the hemiplegia may or may not be preceded by loss of consciousness or clonic spasm in the subsequently paralysed parts; or clonic spasm may occur, which is not followed by paralysis."

Further, that " if paralysis occurs, it can be distinguished from that due to a permanent vascular lesion by the non-occurrence of an extensor plantar reflex."

Finally, Osler[35] classifies the cases into three categories :—

" (a) Healthy individuals with high blood-pressure, but without signs of arterial disease.

" (b) Patients with well-marked arterio-sclerosis, in whom the cerebral attacks have come on without warning, sometimes as the signal symptom. A majority of my cases come in this group.

" (c) In advanced sclerosis with cerebral changes, manifested by progressive mental and muscular weakness, all possible types of these transient seizures, including convulsions, may occur. The attacks are most frequent in the aged, but men in the fifth and sixth decades are also affected."

He mentions the following points in symptomatology : " The symptoms are extraordinarily varied, but tend in individual cases to repeat themselves in the attacks. Sensory disturbances rarely occur alone ; motor paralysis is the most common symptom, and may be hemiplegia, or only the face and hand or arm may be involved. The paralysis, rarely complete, has a transient character which, with the recurrences, give it a peculiar stamp. Complete recovery is, of course, seen in monoplegias and hemiplegias of organic origin, but not in a few hours or in a day. Loss of consciousness is not common in my experience. The diagnosis is based on the existing conditions of high tension, or sclerosis, or both, the slight and transient character of the attacks, and the recurrences."

The two following cases came under my observation :—

CASE 1.—A male, aged 55, came up to hospital giving a history of having had attacks of loss of power in the left arm and leg since two months previously. In these attacks, he stated, he becomes dizzy and has a headache (chiefly on the left side), also that he has complete loss of power in the arm and partial loss in the leg, together with numbness in both arm and leg, and that he then loses consciousness for about half an hour. On regaining consciousness the paresis has passed off. At times during the period of unconsciousness he has passed urine. He has had six such attacks in all. When examined there was no loss of power, and the knee-jerks were normal. There were a few dilated venules on the cheeks. The brachials were thickened and tortuous ; the radials felt contracted. The pulse was occasionally intermittent. The blood-pressure reading was 185 mm.

CASE 2.—A female, aged 64, gave a history of attacks during which there was some weakness of the left hand, with numbness and tingling of the left forefinger and thumb. It was also noticed at these times that the mouth was drawn to the left side, and that there was a feeling of coldness and numbness of the left side of the mouth. The patient stated that these attacks come on suddenly, and last for about a week, and that the first attack was, as far as she recollected, four years before the time when she was seen ; further, that during the next two and a half years there had been

several more attacks, and since then there had been six further attacks. She gave a history of getting up at night to micturate. Patient was found, on examination, to be well nourished and of a high colour. There was no loss of power in the arms or in the face muscles, but the mouth was perhaps drawn slightly to the left. The knee-jerks were normal. The superficial vessels were not obviously thickened; the blood-pressure instrument showed a reading of approximately 210 mm. The heart's apex beat was in the sixth left interspace, approximately in the nipple line. There were no murmurs, but the aortic second sound was accentuated. The superficial veins (especially on the left side) of the chest were enlarged.

In Case 1 the transient character of the attacks of paralysis, and the recurrence within a comparatively short time of the same clinical picture several times repeated, excludes the diagnosis of hæmorrhage, thrombosis, or embolism. I would urge that the most reasonable explanation of the symptoms is that there occurred a spasm of the arterial branches supplying the particular part of the motor area affected, a spasm which caused a temporary interruption to the arterial blood supply with consequent loss of function, but that the circulation became re-established in time to prevent the occurrence of thrombosis in the vessels, followed by softening of the corresponding brain substance, a result that must otherwise have infallibly occurred.

In Case 2 the seizures, although they passed off by no means so rapidly as in Case 1, were very numerous, and all of them apparently presented the same characteristics; this, taken together with the fact that when examined the patient showed practically no abnormal signs in the nervous system, again serves to exclude the three organic vascular lesions.

My experience agrees with the statement of Edgeworth that loss of consciousness or clonic spasm may occur. In view of Russell's experience, and of the facts alluded to above in regard to migraine, I submit that we must amplify Osler's classification with a fourth heading, to include cases without signs either of arterial disease or of high blood-pressure.

The most serious objections to the theory have been urged by Clifford Allbutt. He says that vaso-dilators do not arrest or mitigate cerebral pareses of the kind now before us. This experience, however, is quite opposed to that of Russell. He says again : " In the pia mater the vessels form a network so fine that it is not easy to imagine in a small area an arrest of blood not supplemented by collaterals; partial eclipses in the terminals of the anterior and middle cerebral are conceivable, but cramp so strong and persistent in a circle so narrow, for the paresis is often of small compass, does not seem very probable; if probable, it would surely be not steadfast but capricious, creeping hither and thither, and setting up dissolving views of functional squalls. And why do not such breezes blow about the common and normal brain, playing with us continually ? " [36] Clifford Allbutt [37] also apparently does not believe that sclerotic arteries are specially prone to spasm, a fact which has an important bearing on the theory; but here again Russell's clinical experience is directly opposed to him, as indeed is that of other observers, which may be exemplified in the

second of my cases already alluded to. In speaking of Peabody's case and other similar ones, in which it is asserted that in the corresponding areas of the brain no focal lesions were discovered, he objects that a focal lesion " minute in degree might have been overlooked." He considers that " the weight of evidence in favour of multiple focal lesions in these cases remains considerable," but only gives the clinical history and post-mortem findings in one case which supports his view. In spite of the great weight of the opinion of such a distinguished authority in all pertaining to arterial disease, I cannot but think that the consensus of opinion must be strongly in favour of the theory of arterial spasm, particularly the fact that in such cases the attacks of paresis pass off completely and rapidly, which is hardly conceivable were they due to even a small organic lesion.

If we admit the evidence so far in favour of arterial spasm, it seems reasonable and not more than logical to extend the conception to explain certain symptoms connected with the spinal cord and other areas of the body. Dr. Russell [38] has pointed out that an attack of angina pectoris, perhaps itself due to arterial spasm, may owe its incidence to a reflex action originating after a meal; for it is known that following the ingestion of food a contraction of the systemic arteries takes place, a subject that has been worked at by George Oliver.

It is of interest to note that the following incident in John Hunter's life, [39] a forewarning of the fell disease from which he died, is at any rate thus explicable. If so, is it not at least possible that we have here that which may have led investigators' minds towards the theory of arterial spasm ? " In the spring of the year following, Hunter suffered under an alarming attack of spasm, apparently seated about the region of the pylorus, but attended with a cessation of the heart's action, which lasted three-quarters of an hour, in defiance of various active remedies suggested by Dr. Hunter, Sir George Baker, Dr. Huck Saunders, and Dr. G. Fordyce, who were hastily called in on the occasion. The complaint was probably of a gouty nature, for he had this year escaped a regular fit of gout such as he had suffered from during the spring of the three preceding years; but the immediately exciting cause was a violent mental affection."

It may be further remarked that the great observer himself spoke of " the direct sympathy that exists between the stomach and the most remote organs of the body, and the way in which it may reciprocally affect and be affected by the head," as noted by Dr. J. F. Wood in his oration in 1904, an observation obviously bearing upon the same subject.

As regards nervous symptoms which are explained by arterial spasm, there exist besides those already mentioned transient attacks of amnesia, aphasia, and speech embarrassment.

SPASM OF ARTERIES OF SPINAL CORD.

French neurologists, especially Déjerine, Sollier, and Grasset, [40]

described a syndrome explicable by intermittent spasm of the arteries of the spinal marrow.

Déjerine speaks of this as affecting a man in the prime of life, who notices that fatigue of one of his lower limbs, rarely of both, occurs on exertion more quickly than usual. The limb becomes a little heavy, with a feeling of tension and cramp, the phenomena cease when he stops walking. After weeks, or months, the symptoms increase. He notices difficulty in moving the limb after exertion, and the distance which he can walk before this occurs diminishes. When at rest, however, practically the only sign the patients show is a certain degree of exaggeration of the tendon reflexes. The onset of weakness is announced by abnormal sensations in the limb affected. There is no intense pain. The abnormal sensations, like the paralysis, disappear completely on resting. The patellar reflex, if exaggerated when the patient is at rest, becomes still more so after walking. Sometimes the extensor plantar reflex occurs after walking, but it disappears during rest. Sensibility is unaffected. There is frequent desire to micturate, and genital symptoms. He calls the condition " claudication intermittente de la moelle épinière." It is almost always syphilitic. The affection, if untreated, always leads to spastic paraplegia.

The diagnosis from intermittent claudication of the lower limbs is made by the fact that the pulsation in the arteries of the lower limbs is always intact in the spinal cord affection, and also that there is a complete absence of vaso-motor trouble, the deep reflexes are exaggerated, extensor response of the toes is sometimes obtained, and bladder and genital symptoms are present.

Prognosis is most serious, but the condition can be cured completely if recognized early and energetically treated.

Grasset explains, by the theory of intermittent claudication, paroxysmal and Cheyne Stokes respiration, giddiness, bradycardia, and tachycardia. He describes also a syndrome affecting the posterior columns of the spinal cord, the symptoms of which are paroxysmal, painful constriction of the thorax, abdomen, or of both, giving, according to localization, the impression of a pseudo-angina, a gastralgia, or an abdominal or tabetic crisis.

Time does not permit me to speak further of the application of the theory of arterial spasm to explain symptoms in other parts of the body, such as attacks of abdominal pain, etc.; but surely, if we once admit the existence of arterial spasm in one locality of the body, we cannot reasonably refuse the application of the theory to explain symptoms in other parts. I would emphasize the fact that this hypothesis is of no mere academic interest, but holds out, if we follow out the logical treatment depending upon it, full hope of the prevention of most dire effects.

Thoma speaks of the appearance of the pulse in the retinal arteries on ophthalmoscopic examination as an indication of a diminution of elasticity of their wall. He says that spontaneous hæmorrhages in the fundus oculi are amongst the first indications of angio-

sclerosis.   The indications observed in the small retinal arteries are a change in size; they are thickened, have a double outline, and compress the veins at the crossings, which appear kinked; besides hæmorrhages, greyish-white opacities and streaks of exudation may be seen.

<div align="center">RESPIRATORY SYMPTOMS.</div>

The patient may have unaccountable bronchial cough and expectoration, and often a true winter cough.   There may be paroxysms of dyspnœa in which the face becomes pallid.   Pulmonary œdema in these cases of paroxysmal dyspnœa is liable to occur; it may set in swiftly, and overwhelm the patient suddenly as a fulminant event (Allbutt, *ibid.*).   The signs are not always at the bases.   It is always to be feared in the paroxysmal dyspnœa of high pressures.   Allbutt speaks of a more or less paroxysmal kind of dyspnœa which may come on during rest.   Latent high pressures may be revealed by an attack of dyspnœa at a high level above the sea.   Pneumonia is not uncommon in hyperpietics.

<div align="center">DIGESTIVE SYMPTOMS.</div>

The patient may exhibit biliousness.   The bowels are uncertain; they may be either costive or loose.   Dyspeptic trouble may be an early symptom of arterio-sclerosis.   In patients addicted to high living, the bowels are sluggish, windy, and colicky (Allbutt).   In some patients, the liver is fullish and rather tender; in others, one sees a mere insufficiency, with poor nutrition, failing strength and digestion.   These cases are also subject to irregular glycosuria.   In some of the cases hæmorrhage from the stomach or bowels may occur, but they are not very frequent (Allbutt).   Colic, belching, distension, insomnia, fatigue, and tingling in the limbs may be partly attributable to sclerosis of the abdominal vessels.   A whitening of the stools may occur; these may float in water, or variable traces of sugar in the urine may show vascular decay in the area of the pancreas.   It is said (Chalmers Watson) that examination of the urine and stools in arterio-sclerosis by Cammidge's method is often positive; this may point to sclerosis of the arteries of the pancreas.   There is a kind of paroxysmal vomiting like that of migraine, but in which there is no headache or visual disorder.   This is attended with high arterial pressure, from which, however, in its initial stages, arterio-sclerosis is probably absent.

Uterine hæmorrhages may be only due to arterial disease in the organ.

Intercurrent, transient phases of high pressures occur under more than one set of conditions, and have already been referred to (Pal, Janeway, and others).   They may occur in elderly persons.

<div align="center">URINARY SYMPTOMS.</div>

The urine may be lateritious or alternatively profuse (Allbutt). Generally speaking, the involvement of the kidneys will be indicated by the passage of large quantities of urine of low specific gravity,

frequently necessitating rising at night, and the urine may or may not contain albumen or casts.

DIAGNOSIS.

In making the diagnosis, little more need be said beyond emphasizing the fact that the symptoms of hyperpiesia may be mistaken for those of neurasthenia, and that a careful personal and family history is of great importance.

REFERENCES.

1 F. A. Mahomed : " Some of the Clinical Aspects of Chronic Bright's Disease," *Guy's Hospital Reports*, 1879. **2** " The Etiology of Bright's Disease," *Roy. Med. Chir. Soc. Trans.*, 1874. **3** Huchard : *Maladies du Cœur*, Vol. I., p. 71, 1899. **4** Allbutt : " Senile Plethora," *Trans. Hunterian Soc.*, 1895–6. **5** T. D. Savill : *Brit. Med. Journ.*, 1897, 188, also *Trans. Path. Soc.*, London, 1904. **6** W. Russell : *Arterial Hypertonus, Sclerosis, and Blood-Pressure.* **7** E. H. Colbeck : " The Pathogenesis of Arterio-Sclerosis," THE PRACTITIONER, Feb., 1908. **8** O. K. Williamson : " Clinical Observations on the Influence of the Vessel Wall on (so-called) Arterial Blood-Pressure Readings," *Proc. Roy. Soc. Med.*, 1909. **9** R. Thoma : *Virchows Archiv.*, 1888, XCIII., 58; Thoma und Kaefer : *Ibid.*, 1889, CXVI., 1–60; also Vols. CIV. and CXII. **10** Allbutt : *Diseases of the Arteries, including Angina Pectoris.* **11** Colbeck : THE PRACTITIONER, Feb., 1908. **12** Mahomed : " Some of the Clinical Aspects of Chronic Bright's Disease," *Guy's Hospital Reports*, 1879. **13** Mahomed : " The Etiology of Bright's Disease," *Roy. Med. Chir. Trans.*, 1874. **14** Sahli : *Diagnostic Methods.* **15** Huchard : *Ibid.* **16** Riesman and others : *Amer. Journ. Med. Soc.*, April, 1913. **17** Mackenzie : *Brit. Med. Journ.*, Oct. 20, 1906, and other papers. **18** Mott : *Allbutt's and Rolleston's System of Medicine*, Vol. VI., " Arterio-Sclerosis." **19** Allbutt : *Diseases of the Arteries, including Angina Pectoris.* **20** Mott : *Ibid.* **21** Mott : *Ibid.*, pp. 611–2. **22** Mott : *Ibid.*, p. 611. **23** Charcot : *Compt. rend. Soc. Biol.*, Paris, 1858; *Progrès méd.*, Paris, 1887, and *Bull. méd.*, Paris, 1891, Vol. 1105. **24** Ringer and Sainsbury, also H. H. Dale : *Journ. of Physiol.*, Vol. XXIV., No. 3. **25** Noyes : *Text-book on Diseases of the Eye*, 1890, p. 547. **26** Wagenmann : *Archiv für ophthalmologie*, bd. XLIV., 1897, s. 219. **27** R. A. Lundie : *Ophthalmic Review*, May, 1906. **28** Benson : *Trans. of the Eighth Inter. Ophthal. Cong.*, 1894, p. 81. **29** Allbutt : *Ibid.*, Vol. I., p. 433. **30** *Ibid.*, p. 434. **31** George Peabody : An Address to the Practitioners' Society of New York, entitled, " A Contribution to the Symptoms and Pathology of Endarteritis Obliterans." **32** George Peabody : " The Relation of Arterial and Visceral Changes," *Trans. of Assoc. of American Physicians*, Vol. IV., p. 170. **33** William Russell : *Arterial Hypertonus, Sclerosis, and Blood-Pressure.* **34** Edgeworth : *Scot. Med. and Surg. Journ.*, Nov., 1906. **35** Osler : " Transient Attacks of Aphasia and Paralysis in states of High Blood-Pressure and Arterio-Sclerosis," *Canadian Med. Assoc. Journ.*, Oct., 1911. **36** Allbutt : *Ibid.* **37** *Ibid.* **38** Russell : *Ibid.* **39** *The Life of John Hunter*, by J. F. Palmer. **40** Déjerine : *Rev. Neurol.*, Paris, 1906, XIV., 341; Grassett : *Rev. Neurol.*, Paris, 1906, XIV., 433.

THE CLINICAL VALUE OF MINIMUM BLOOD-PRESSURE RECORDS.

By LESLIE THORNE THORNE, M.D., B.S., ETC.

Late Medical Examiner, L.C.C. Technical Education Board.

NOT many years ago, observations upon the blood-pressure of patients were the exception rather than the rule, and the whole subject was regarded more as a matter of interest to the physiologist, than as a valuable aid to the clinician in the diagnosis, prognosis, and treatment of diseases of the heart and circulation. At the present time it is almost the universal practice to take the maximum blood-pressure in any case of circulatory disease, and the great help that such a record gives is only doubted by those who have not made themselves conversant with the manipulation of the sphygmomanometer, and the deductions to be obtained from the readings.

The importance of the record of minimum pressure is not, however, by any means so widely appreciated, and comparatively few investigations have been made with regard to its clinical significance, though it has been the subject of much valuable laboratory research work, and will, I believe, in time, be used and valued as universally as the maximum pressure is to-day.

Having made some 5,000 observations of the minimum pressure of patients suffering from various forms of cardiac and circulatory disease, and having arrived at certain conclusions from the results of these investigations, I believe they may be of some interest from a clinical standpoint, though I am fully aware that there is still much work to be done with regard to the significance of minimum blood-pressure records, and that further research is necessary in order to ascertain their full value in diagnosis, prognosis, and treatment.

For the purpose of my investigations I use the late Dr. George Oliver's manometer and phonendoscope, with a head-spring. The head-spring is much more satisfactory than ear-plugs, for the usual form of ear-plugs supplied with the instrument are not only very apt to slip out of the ears, but they make the entrance to the meatus very sore after a time, because they have to be pressed in firmly in order not to slip.

The maximum blood-pressure is indicated by the reading on the manometer at the instant when the bruit, heard on the stethoscope connected with the tampon, ceases; it coincides with the moment at which the lumen of the brachial artery is entirely closed by the pressure of the armlet. The minimum blood-pressure is indicated by the reading on the manometer at the instant when a faint bruit is first heard on the stethoscope connected with the tampon; it coincides with the moment when the pressure of the armlet *begins* to flatten the brachial artery.

I have intentionally used the words " maximum " and " minimum "

blood-pressure, in preference to " systolic " and " diastolic," because I do not believe that the two readings obtained upon the manometer have any close relationship to the systole and diastole of the heart, nor that the heart has any large share in the production of excessive blood-pressures.[1] The most important factors in the regulation of arterial tension are the contractility and elasticity of the arteries, arterioles, and capillaries, and disorders of tension are produced by any conditions which affect the normal action or structure of these vessels. In all cases of hypertension the predominant factors producing the high blood-pressure are—

1. Organic degeneration of the vessel walls.
2. Spasm of the muscular structure of the vessel walls, set up by toxins in the blood.

In clinical study one often finds these two factors working together, and this is what one would expect, because degeneration of the vessel walls is brought about by the presence of toxins in the blood ; therefore, when there are toxins present, degeneration will sooner or later supervene if the case is not diagnosed and properly treated. There is a stage in these cases at which degeneration has not begun, and, at this stage, treatment will eliminate the toxins, put an end to spasm of the muscular structure of the vessel walls, and thereby lower the blood-pressure to normal.

It is in cases in which there is doubt whether degeneration of the vessel has begun that the minimum blood-pressure record is of most value, for my investigations have led me to the conclusion that, *when the minimum blood-pressure is not raised above 90 mm. Hg., there is no vessel degeneration present, however high the maximum reading may be.*

There are some exceptions to this rule, with which I will deal later, and it must also be borne in mind that one rarely gets an excessively high maximum reading in a case in which the minimum reading is normal or only slightly raised. It is in the borderland cases, in which neither the minimum nor the maximum readings are excessively high, that the differentiation in diagnosis is of the utmost importance, both from the point of view of treatment and prognosis, more especially so in questions involving the duration of life, such as life assurance. Up to the present time blood-pressure records are not an essential part of the examination for life assurance in England, though I believe their importance is almost universally recognized in America. Why such a valuable clinical aid in the estimation of the duration of life is not taken advantage of in this country, I fail to understand.

Dr. O. K. Williamson[2] holds the view that, " in atheromatous cases, the minimum pressure is little if at all above normal." He does not, however, state the number of cases or observations upon which he founds this theory, and it is, therefore, impossible to know what weight to attach to it. My investigations have led to an entirely opposite view, if one excludes some exceptional cases in which one does find definite atheroma of the vessels accompanied by a comparatively low minimum blood-pressure, but these cases are rare, and will, I believe,

be placed in a class by themselves on further investigation. These cases constitute the third group of exceptions to the general rule I have enunciated regarding the significance of a raised minimum blood-pressure. In my earlier investigations[3] upon the clinical significance of the ratio between the maximum and minimum blood-pressures (pulse-pressure), I came to the conclusion that an increased pulse-pressure always indicated degenerate vessels. As will be seen from this paper, further research has proved that, although this is usually the case, yet there are exceptions to this rule.

It is of the utmost importance, in comparing minimum and maximum blood-pressure records, to make a large number of observations on the same patient before arriving at any conclusions, for any mental excitement or physical exertion will affect both the minimum and maximum blood-pressures and the ratio between these two. The patient should get quite accustomed to the process and to the doctor, for records taken by a stranger for the first time are practically always misleading.

The first group of cases which do not conform to my rule are those in which marked aortic regurgitation is present. In these the minimum blood-pressure is always subnormal, however degenerate the vessels may be, or however high the maximum blood-pressure. The following two examples are illustrative of this condition :—

CASE 1.—A man, aged 41 years, had double aortic disease, mitral regurgitation, greatly hypertrophied heart, and very markedly degenerate vessels He had a history of alcoholism, and suffered from very frequent and severe attacks of angina pectoris; his blood-pressure was 50–190 mm. Hg. After a course of " Nauheim " baths his pressure had fallen to 50–110 mm. Hg., and he entirely recovered from his anginal attack for a long period.

CASE 2.—A man, aged 42 years. He had had rheumatic fever, and suffered from aortic regurgitation, double mitral disease, and a greatly hypertrophied heart. His blood-pressure was 50–160 mm. Hg. After a course of " Nauheim " baths the pressure was 25–110 mm. Hg. The very low minimum pressure seemed to cause him no inconvenience; he was, in fact, greatly improved in health, and was able to take up some regular work, whereas he had been unable to do any work for four years before treatment.

The second group of cases, which is an exception to the rule, is that in which there is severe mitral regurgitation and considerable cardiac hypertrophy, but the vessels are perfectly healthy. Despite the fact that the vessels are healthy, the minimum as well as the maximum blood-pressure is raised above the normal. Case 3 is an example of this class.

CASE 3.—A young woman, aged 21 years, had had rheumatic fever twice. The left ventricle was very much hypertrophied, and there was severe mitral regurgitation, the vessels were quite soft and healthy, and the blood-pressure was 100–140 mm. Hg. A maximum blood-pressure of 140 mm. Hg. is decidedly high for a girl of 21 years of age. After a course of " Nauheim " baths her pressure had dropped to 70–125 mm. Hg. Sixteen months after treatment the pressure was only 60–130 mm. Hg. The fact that the minimum pressure remained low for so long a time after treatment, although it was abnormally high before, together with the healthy softness of the vessels, proves that there was no vascular degeneration in this case, for, in cases

in which there is vascular degeneration, although treatment will reduce the minimum as well as the maximum pressure for a time, yet the minimum always rises above normal again in a very short time.

There is still another class of case which does not conform to the general rule I have laid down; examples of it are found in people past middle age, or of advanced years, who, notwithstanding the fact that their vessels are markedly thickened, and their maximum blood-pressure is decidedly high, yet exhibit a normal, or nearly normal, minimum pressure. Up to the present time I have not been able to discover why this special group of cases does not have a raised minimum blood-pressure; this point undoubtedly requires further investigation. Sir Clifford Allbutt[4] divides cases of arterio-sclerosis into two classes, hyperpietic and decrescent; personally, I believe that research will reveal more than two classes of this insidious disease which, not only, as Dr. T. Bodley Scott says,[5] " enters very largely into the failures of health and into the premature deaths that occur so frequently between the ages of forty-five and sixty," but is becoming more and more common in comparatively young people.

The following is an example of this third class :—

CASE 4.—A lady, aged 59 years, suffered from marked arterio-sclerosis; her vessels were thickened and tortuous, her blood-pressure was 90–190 mm. Hg. before treatment, and fell to 85–150 mm. Hg. after treatment, but soon rose to 80–170 mm. Hg. again.

I have purposely not attempted to give names to these different classes of arterio-sclerosis, because I do not think that labelling them would be of any advantage in the present state of our knowledge upon this subject.

Having dealt with the exceptions, I turn now to the large majority of cases which conform to my rule, and which exhibit a markedly raised maximum blood-pressure and a normal, or slightly raised, minimum pressure. In these cases no degeneration of the vessels is discovered, and the maximum blood-pressure is reduced to normal and remains so for a lengthy period. The history and behaviour of this group point to the fact that the maximum high tension is due to spasmodic contractions of the muscular substance of the vessel walls, and that they have not arrived at that stage of the disease at which degeneration of the vessels sets in. Such cases are in a pre-sclerotic stage of hypertension, and are completely curable if treated in time, and can, I maintain, be recognized by the fact that, although the maximum pressure is raised, yet the minimum remains normal; hence arises the great importance of taking minimum pressure records. The following two cases are taken from a very large number I have investigated and treated; they are typical of their kind, and are illustrative of the above condition :—

CASE 5.—An officer, aged 21 years, suffered from shell-shock and irritable heart. His heart was somewhat dilated, his pulse rapid, and his blood-pressure 70–150 mm. Hg. He suffered from exhaustion on the least exertion, and consulted me after a long period of sick-leave. After a course of five weeks' treatment, the cardiac dilatation had disappeared, the pulse was

normal in rate, and the blood-pressure was 50–100 mm. Hg. He has now been back in the army for about eighteen months and keeps in good health.

CASE 7.—A man, aged 35, who had been subject to very heavy physical work for some years, developed a dilated heart and very irregular cardiac action, after an attack of influenza. A polygraphic tracing proved the irregularity to be due to very frequent premature auricular contractions. He had to give up all work and lead an invalid life. His blood-pressure was 80–160 mm. Hg. After five weeks' treatment it had dropped to 80–130 mm. Hg. Three or four months after treatment he was able to take up work again, and has now been working for about eighteen months. His blood-pressure, a year after treatment, was 80–130 mm. Hg.

I have only given a very short outline of the above cases, because my object in quoting them is to prove my theory regarding the importance of the minimum blood-pressure as a clinical sign, and not to go into details of symptoms and treatment.

This paper is the result of observations of cases over a period of some years, and, although I believe the conclusions I have drawn are correct, I am convinced that there is still much to be learnt from a careful study of this subject. As the instruments required for the purpose are neither expensive nor cumbersome, and the time needed for each individual observation is not lengthy, I believe that a wide field of research is open to the general practitioner interested in the subject, who will make careful observations and take notes of them. I am convinced that, in this matter, the general practitioner has a very decided advantage over the specialist and hospital physician, because he usually sees his patients a number of times over a period of many years, and is, therefore, in a specially advantageous position to note the various manifestations of a disease, one definite characteristic of which is its slow and insidious development. He will often get the opportunity, which the specialist rarely has, namely, that of detecting the disease in its earliest manifestations, at a stage when it is completely curable.

TREATMENT.

There are two classes and two stages in the full development of arterio-sclerosis with hypertension.

1. (a) The pre-sclerotic class, in which the heart is still able to cope with the raised blood-pressure and cardiac dilatation has not set in.

(b) The pre-sclerotic class in which the heart has begun to give way under the increased pressure and cardiac dilatation is present.

2 (a) The sclerotic class, in which, despite raised blood-pressure and diseased vessels, the heart has not given way.

(b) The sclerotic class, in which the heart has begun to fail and cardiac dilatation is present.

In all the above, the objects aimed at in treatment are to give the heart and circulation a comparative rest, to encourage in every way the throwing off of the toxins which cause high tension, and to reduce to a minimum the intake of everything likely to raise the blood-pressure.

In the first stage of Class 1, cure may be obtained by a careful

dietary, the administration of suitable drugs, and the general regulation of the habits of life; and in the first stage of Class 2, much good may be done by similar treatment. I do not propose to enter into details of the general treatment, because it has been ably dealt with by several writers upon the subject, notably, the late Dr. George Oliver[6] and Dr. T. Bodley Scott,[7] but I do wish to emphasize the fact that treatment by drugs, dietary, and general rules of life only, does not give satisfactory results in the second stage of either class. When the cardiac muscle is overstretched and the heart dilated, it is almost as unwise to administer drugs, which stimulate the heart and do not lower the blood-pressure, as it is to depend upon those which are reputed to lower the blood-pressure and undoubtedly depress the cardiac action. It is useless to expect a regulation of diet or a modified rest cure to restore the cardiac tone and cure the dilatation, for they will not do this unaided.

In my experience, the best method of treatment, in both classes and both stages of this disease, is to give a course of " Nauheim " baths in conjunction with general treatment by drugs, dietary, and modified rest. In cases in which cardiac fatigue and dilatation has supervened upon hypertension, either in the pre-sclerotic or the sclerotic stage, this is certainly the only treatment which will give good results of long duration, because it lowers the blood-pressure, slows and strengthens the cardiac action, improves the circulation in all the organs of the body, and thereby facilitates the excretion of the waste products which are the cause of the disease.

CONCLUSIONS.

1. The importance of taking the minimum blood-pressure in all cases of disease of the heart and circulation is only secondary to that of taking the maximum pressure.

2. When the minimum blood-pressure is not raised above 90 mm. Hg. there is no vessel degeneration, although the maximum reading may be high.

3. There are three chief classes of exceptions to this rule.

4. The full value of blood-pressure records can only be obtained by constant practice and repeated observations.

REFERENCES.

[1] Leslie Thorne Thorne : " The Relation of Cardiac Systole to Arterial Tension." THE PRACTITIONER, April, 1912.

[2] " The Importance of Diastolic Readings in the Differentiation of Treatment of High Blood-Pressure." THE PRACTITIONER, February, 1918.

[3] " The Clinical Significance of Blood-Pressure Records.' THE PRACTITIONER, March, 1913.

[4] Clifford Allbutt : *Diseases of the Arteries, including Angina Pectoris.*

[5] T. Bodley Scott : *Modern Medicine and some Modern Remedies.*

[6] Dr. George Oliver : *Studies in Blood-Pressure.*

T. Bodley Scott : *Modern Medicine and some Modern Remedies.*

THE RELATION OF BLOOD-PRESSURE TO THE PSYCHO-NEUROSES.

By PAUL BOUSFIELD, M.R.C.S., L.R.C.P.

Physician to the Lancaster Clinic (Ministry of Pensions) for the treatment of the Psycho-Neuroses of War.

OBSERVATION extending over a large number of cases has convinced me that the blood-pressure is not only of some value in the differential diagnosis of the psycho-neuroses, but that it is also of considerable importance in their treatment. The difficulty in discussing the differential diagnosis of these conditions lies partly in the varied nomenclature, and partly in the fact that no two writers mean the same thing by the terms used. Anyone who has read descriptions of neurasthenia, psychasthenia, and so forth in the ordinary medical text-books will have been struck by the fact that the authors differ materially in their conception of these diseases, and that the signs are very vaguely dealt with.

It is very necessary, therefore, to give some preliminary definition of the neuroses with which I intend to deal, and to explain shortly to what conditions I refer when using specific terms. Apart from some of the more or less congenital or constitutional psychasthenias, there are three common and definite conditions, and with these only do I intend to deal. The three conditions may be conveniently named neurasthenia, hysteria (conversion hysterias and compulsion hysterias), and the anxiety-neuroses (anxiety hysteria).

Too little attention is paid by many physicians to a differential diagnosis, especially between neurasthenia and the anxiety-neuroses. A very large proportion of the latter which have come under my notice have been labelled and treated as neurasthenia. When one realizes that the treatment for these conditions should be essentially different, the importance of a differential diagnosis at the earliest possible moment can be seen.

Some anxiety-neuroses are superficially extremely like neurasthenias, and, indeed, it is not uncommon to find an anxiety-neurosis superimposed upon a neurasthenia; therefore, any signs which may help us to differentiate the conditions are of value.

The neurasthenic patient may complain of depression, headaches, sensation of pressure on the skull, indefinite spinal pain or weakness, insomnia, marked general asthenia, and of impaired memory and powers of concentration. There is often considerable loss of weight, the muscles are flaccid, the reflexes generally sluggish. Phobias and obsessions are absent, except in the form of hypochondriasis. The condition has generally come on gradually.

Patients with an anxiety-neurosis may complain of fits of depres-

sion, headaches, insomnia, great irritability and of impaired memories and concentration. Unsubstituted phobias,* anxiety tremors, giddiness, profuse perspiration, tachycardia may be present. The apex beat of the heart is often visible, the first sound at the apex being forcible and metallic in quality; the diaphragm may be but slightly used, the breathing being chiefly of the costal type. Dyspnœa, stammering and hesitant speech are often present; terrifying dreams and sudden awakenings at night are common. The various glandular secretions are disturbed, especially those of the stomach. There may be nausea, disturbance of appetite, diarrhœa, or constipation; the patient becomes easily fatigued, and may even collapse and fall to the ground powerless without, as a rule, completely losing consciousness. His muscles may be spastic, his reflexes are generally exaggerated; he may be very emotional. The condition has come on rapidly or spontaneously.

I do not intend to discuss the symptoms of hysteria, for this is not often confused with neurasthenia. It is obvious, however, that many of the symptoms of neurasthenia and of an anxiety-neurosis are very similar. Moreover, a neurasthenic may have asthenic tremors, nausea from an actual gastric lesion, etc., and an anxiety-neurosis may have the more obvious signs in a very slight form, or may be reticent in describing his phobias and symptoms. Under such circumstances, I have found the blood-pressure of considerable value, especially in young subjects.

In a pure neurasthenia, unless complicated by organic disease, the blood-pressure is usually sub-normal. In a conversion hysteria, it is generally normal ; in an anxiety-neurosis, it is more often than not considerably above the normal. If we are dealing now with young patients, and we find that their blood-pressure is anything from 135 m.m. to 150 m.m., we have strong reason for thinking that their condition is a pure anxiety-neurosis. The arteries in these latter cases show, on palpation, considerable hypertension, which we might almost expect as part of the syndrome which causes also some spasticity of muscle with tremors, exaggerated reflexes, disturbances of secretion, etc. Generally speaking, we may say that the vaso-motor disturbances of neurasthenia are those of dilatation and hypotension, while those of an anxiety-neurosis are of constriction and hypertension.

Now this fact I find of considerable value in treating these cases. I believe the headache in the anxiety-neurosis to be caused very often or exaggerated by the slight raising of the blood-pressure. By lowering the blood-pressure, and thus relieving one of the most distressful symptoms, I find improvement of the general condition by psycho-therapeutic methods takes place more rapidly. In instances in which I can only see a patient for about one hour during the week, I nearly always give $\frac{1}{100}$ gr. of nitro-glycerine nightly for a week,

* By an unsubstituted phobia I mean one which is not reducible to a repressed wish or idea. It is a mere expression of anxiety seizing upon a convenient experience—such are agoraphobia, claustrophobia, etc., and the ear of darkness, thunderstorms, etc.

followed, perhaps, by half that dose during the next week. The blood-pressure in four cases out of five does not again rise, if the psycho-therapeutic treatment is, at the same time, being applied.

In neurasthenia, the treatment is totally different. Freud holds that psycho-analytic methods are of little value here, though, personally, 1 have seen improvement under it in some cases. I generally, however, endeavour to raise the blood-pressure in such patients, and this seems of some slight value.

I append herewith a few extracts from cases of anxiety-neuroses to illustrate the significance of the blood-pressure as one of the signs in the syndrome.   The following abbreviations are used :—

    B.P. = Blood pressure.
    S.   = Systolic.
    D.   = Diastolic.
    N.G. means that small doses of nitro-glycerine were given during the following week.
    a, *b*, *c*, *d*, etc., represent the weekly intervals at which blood-pressures were taken.

CASE 1.—Age 28. Headache, insomnia, depression, sweating, dyspnœa, asthenia, bad dreams, memory and concentration bad.

    (*a*) B.P. —;   S., 147 m.m.;   D., 115 m.m.;   N.G., gr. 1/100.
    (*b*) B.P. —;   S., 140 m.m.;   D., 105 m.m.;   N.G., gr. 1/200.
    (*c*) B.P. —;   S., 125 m.m.;   D. 100 m.m., thereafter no further rise of blood-pressure.

This case was treated by psychological analysis of his war memories. It consisted of a pure anxiety-neurosis, and was cured after seven attendances.   Previous to this treatment, the man had had eight months' hospital treatment, without improvement.   The headache and insomnia were much relieved in under a week.

CASE 2.—Age 25.   Headaches, insomnia, depression, irritability, delusion of persecution, impotent for past year.

    (*a*) B.P., —;   S., 142 m.m.;   D. 115 m.m.;   N.G., gr. 1/100.
    (*b*) B.P., —;   S., 138 m.m.;   D. 100 m.m.;   N.G., gr. 1/200.
    (*c*) B.P., —;   S., 132 m.m.;   D., 95 m.m.;   N.G., gr. 1/200.
    (*d*) B.P., —;   S., 124 m.m.;   D., 90 m.m., thereafter no further rise of blood-pressure.

This case was an anxiety-neurosis superimposed upon a hysteria. He had had nearly 18 months' hospital treatment before discharge. The treatment consisted of psycho-analysis.   The impotence was cured after one attendance, the remainder after 18 sittings.   The hysteria was of sexual origin, and went back to childhood.   The headache and insomnia began to improve after about 12 days.

CASE 3.—Age 24.   Headaches, depression, stammer, claustrophobia, bad dreams, obsessional pains, tremors, hysterical vomiting (anxiety-neurosis superimposed on a conversion-hysteria).

    (*a*) B.P., —;   S., 149 m.m.;   D., 100 m.m.;   N.G., gr. 1/100.
    (*b*) B.P., —;   S., 125 m.m.;   D., 90 m.m., no further rise of blood-pressure.

This case was an anxiety-neurosis superimposed upon a hysteria.

The treatment was psycho-analysis. The patient had received nine months' hospital treatment with slight improvement. He was discharged cured after 17 attendances, extending over three weeks. The headache nearly disappeared after three days.

CASE 4.—Age 34. Headache, insomnia, giddiness, occasional " collapse," very nervous tremors.

    (a) B.P., —; S., 165 m.m.; D., 125 m.m.; N.G., gr. 1/100.
    (b) B.P., —; S., 150 m.m.; D., 115 m.m.; N.G., gr. 1/100.
    (c) B.P., —; S., 132 m.m.; D., 112 m.m., the blood-pressure afterwards rose to about 137 m.m., and remained about that point.

This case, a pure anxiety-neurosis, had received nearly two years' hospital treatment with slight improvement only. Psychological analysis of war memories and pre-war sex complexes was carried out, together with some suggestion. The patient was discharged nearly well, but not quite cured, after eight attendances. The headache and insomnia were relieved very much in about 12 days.

CASE 5.—Age 27. Headaches, insomnia, fine tremors of hands, impaired memory and concentration.

    (a) B.P., —; S., 158 m.m.; D., 115 m.m.; N.G., gr. 1/100.
    (b) B.P., —; S., 133 m.m.; D., 102 m.m.; N.G., gr. 1/200.
    (c) B.P., —; S., 124 m.m.; D., 96 m.m., thereafter no further rise in blood pressure.

This case also was a pure anxiety-neurosis, and was treated as in the last case. He had received previously about five months' hospital treatment without relief. The headache disappeared after about the fifth day. The insomnia improved about the same time.

CASE 6.—Age 34. Headaches, insomnia, depression, giddiness, unilateral sweating, some loss of weight, tremors.

    (a) B.P., —; S., 142 m.m.; D., 105 m.m.; N.G., gr. 1/100.
    (b) B.P., —; S., 138 m.m.; D., 105 m.m.; N.G., gr. 1/200.
    (c) B.P., —; S., 132 m.m.; D., 102 m.m.

At this stage I left off the drug, and the blood-pressure at once returned to the neighbourhood of 140 m.m. Later I found this case to be one of an anxiety-neurosis, superimposed upon a definite neurasthenia, and I sent the patient into the country for treatment. Whether he had a definite organic lesion or whether his blood-pressure was always above normal for his age I could not say. The headaches were not relieved.

CASE 7.—Age 23. Headaches, nervousness, emotional, occasional nausea.

    (a) B.P. —; S., 142 m.m.; D., 115 m.m.; N.G., gr. 1/100.
    (b) P.B., —; S., 122 m.m.; D., 98 m.m., thereafter no further rise in blood pressure.

This case was a pure anxiety-neurosis, and had received about 18 months' hospital treatment without relief. Psychological analysis of war memories was the only further treatment. He was cured after 10 attendances. The headaches disappeared completely after four

days.

Such cases might be multiplied indefinitely, but these suffice to show that the blood-pressure in most of these cases was supernormal, and that, on its reduction, which was accomplished without much difficulty, it did not again rise. The headaches generally improved very quickly, and the patients' attention was more readily held by the psycho-therapeutic methods carried on simultaneously. At the same time, the relief of the headache (and improvement in sleep) no doubt acted as a " suggestion " towards relief of other symptoms, whether the course of treatment were either suggestive or psycho-analytic.

Among other interesting facts elucidated during my investigation one was that those who suffered from great sweating were, as a rule, those in whom the blood-pressure was not relieved so readily by nitro-glycerine. The reason of this I do not at present know.

It may not be out of place here to make a few remarks on the ætiology of " shell shock." About 80 per cent of the cases which come before me of either " shell shock " or " neurasthenia," consist of anxiety neuroses of the *pre-war type*. I have devoted many months to pyscho-analysis of these cases, and in practically every instance find, behind the shock of active service an abnormal erotic condition of pre-war times. These generally consist of infantile fixations, with a strong " father complex," though other conditions are also present. Whether this fact would justify us in describing the cases as not caused by war service is a difficult problem. Undoubtedly the material for the neurosis is generally present beforehand, and military conditions merely act as " the last straw which breaks the camel's back." Of course, without such military conditions (which often does not extend even to foreign service), one may safely say that the majority of the patients might never have had the last straw applied, and that they would have been able to carry their other abnormal material without ever becoming aware of it.

I am indebted to the Director of Medical Services of the Ministry of Pensions for permission to publish these cases.

THE QUESTION OF A NATIONAL MEDICAL SERVICE.

By WILLIAM A. BREND, M.D.

Lecturer on Forensic Medicine, Charing Cross Hospital, etc.

THE future of the medical profession is now engaging the attention of doctors of all classes more seriously than at any previous time. Several causes have contributed to bring about, in the minds of both consultants and general practitioners, a state of uncertainty as to what is going to happen to them, and how their work will be affected by the changed conditions which will follow the war. In the first place, and apart from any interference by the State, it must be recognized that, from the purely material point of view, private practice is likely seriously to suffer. In common with all other learned professions, medicine will be affected by the diminution in the number of wealthy persons who are able to pay good fees, and any attempt to raise charges will probably result only in a further curtailment of remunerative private practice. This change will affect all medical men, though some more than others, from Harley Street downwards. In good-class artizan neighbourhoods an increased proportion of persons will justifiably seek the assistance of hospitals, and a larger number of that considerable body of insured persons who preferred to be treated as private patients will now avail themselves of medical benefit. Throughout the country the calling up of medical men for Army Service has led to the decrease, or even actual disappearance, of medical practices. and, in many cases, it will be impossible to retrieve the loss.

But while thus the opportunities for making an income from private practice are diminished, the standard of capacity and knowledge demanded by the community from the doctor ever enlarges. The medical curriculum tends to become longer, the volume of knowledge to be assimilated grows, and the cost of books and instruments, and fees for additional lecture courses continually increase. Even if the actual qualifying period is not lengthened, relatively few men now feel justified in undertaking practice as soon as they are qualified, and most further equip themselves for their profession by holding hospital appointments or undertaking special courses of study. Thus, simultaneously, the difficulty of becoming thoroughly competent in the profession increases, and the likelihood of material return from the exercise of that profession decreases.

In addition to this situation, which would have arisen in any case as a result of the war, there is the further uncertainty resulting from the possibility of action by the State affecting the exercise of medical practice. Improvement of public health and repair of the losses of

war have now been recognized very definitely as being of the utmost national importance, and it is clear that in many directions Government control will be exercised, or Government assistance rendered, in matters which have hitherto been left to private enterprise and initiative. The projected Ministry of Health Bill, so far as its proposals are known, is understood not to deal with the question of providing medical services. Nevertheless the possibility of such a development at a later date cannot be ignored by the profession.

In these circumstances, it is not remarkable to find that the leading organizations of the medical profession—the Royal Colleges, the Royal Society of Medicine, and the British Medical Association—are all devoting very serious attention to the possibilities of the future. Nor is it remarkable that great diversity of view exists as to the way in which the services of the medical profession can best be utilized in the interests of the community. It may be helpful to set out briefly the leading views relating to the question of a national medical service.

In April of this year, Major Gordon Dill opened a discussion at the Royal Society of Medicine on the Future of the Medical Profession under a Ministry of National Health, which was continued over three sessions.[1] The scheme outlined by Major Dill provided for control of a medical service by a central authority with administration through local authorities. The country should be divided into districts, with a medical man allotted to each district, working under a county director; at the same time there should be no unnecessary limitation of freedom of choice between doctor and patient or restriction of the opportunities of private practice. Consultants would be appointed to areas of suitable size. The existing State hospitals, infirmaries and asylums were to be re-organized and properly equipped in order to relieve the burden upon voluntary hospitals, which could then admit patients who were willing and able to pay for their maintenance in hospital.

In his Cavendish Lecture in July,[2] Major-General Sir Bertrand Dawson sets forth a more highly elaborated scheme much of which would receive the approval of all sections of professional opinion. He emphasizes the importance of "team work," that is, the co-operation of the consultant, the bacteriologist, the radiographer, and other specialists with the general practitioner in the diagnosis and treatment of disease. The medical service is to be open to all classes, and the system of working is through local clinics at which the doctors, on payment of a small rent, are to be allowed to receive private patients as well as those who avail themselves of the public medical service. The clinics should be staffed on the basis of part-time service paid by salary. Speaking of a whole-time salaried service, Sir Bertrand Dawson says :—

" It would be gravely detrimental to the best interests of both patients and doctors. In few callings is there such a wide gap between the minimum and the maximum efforts, efforts which make demands upon heart as well as head. The distinction between the performance of a routine duty and the fixing of the mind on each individual problem is vital. Liberty of

action, the stimulating force of rivalry and the personal touch are essential."

In small towns, the clinics would be in the proximity of the hospital; in larger towns, they would often have to be separated from the hospitals. The central hospital of a large town is to provide the staff for local hospitals in its district, and the central hospitals in their turn may be subordinate to larger provincial hospitals. The panel service is to remain as heretofore, but insured persons are to have the advantage of attending at the clinics. The work of teaching hospitals is to be much extended, and for this a State subvention will be required. It is suggested that, for five years after his appointment, every member of the staff should be a whole-time salaried officer, who should devote himself to training, teaching, and research, and not be permitted to undertake private practice. For the succeeding ten years he should give half his time to the service.

The widest demand for State control is contained in the scheme put forward by Professor Benjamin Moore and Mr. C. A. Parker, the President and Hon. Secretary respectively of the State Medical Service Association.[3] These writers advocate a State medical service which is free and open to all, and is officered by whole-time salaried practitioners, the service to include consultants, pathologists, midwives, nurses, etc. The hospitals are to be given the choice of being taken over by the Ministry of Health, receiving grants from the public authorities, or remaining on an entirely voluntary basis. The general practitioners are to work in groups, but would be in close touch with the hospital centre, and would form an integral part of the staff of the hospitals. Patients residing within the area would ordinarily have the free choice of any doctors belonging to the group, but means must be devised for preventing an uneven distribution of the work. This service cannot be established at once, but must be preceded by a transition period during which every registered medical practitioner might be given an option of becoming either a part-time or whole-time medical officer, but anyone qualifying after the passing of the Act and electing to join the service should be accepted only as a whole-time salaried officer. In this way a complete whole-time service would gradually be built up.

There are certain features common to nearly all the schemes proposed which obtain widespread assent. Thus it is generally acknowledged that under any scheme the practitioner, whether in private practice or an officer of the State, must be given greater facilities for utilizing the scientific developments of his art. The provision of laboratories for pathological investigations, etc., touches no vested interests, and could be arranged with universities, medical schools, and public health authorities comparatively easily. Indeed, steps were taken to do this in 1914, but their completion has been delayed by the war. This provision alone would make a substantial improvement in the standard of general practice, particularly in working-class neighbourhoods. Again, everyone is agreed that the facilities for nursing should be improved and the establishment of some form of public

T

nursing service, at least in the poorer urban areas, does not appear to present insuperable difficulty.

In regard to the voluntary hospitals, the trend of opinion is strongly in the direction that they should continue under their present management, but should receive subsidies from the State in return for the performance of certain specific duties. This system is already in operation in the treatment of venereal disease and, to some extent, in the treatment of school children and those suffering from tuberculosis. It appears to be a *via media* which is approved by the profession, helps to meet the needs of the community, and will not check the flow of charitable subscriptions. The proposal that the hospitals should be taken over by the State in their entirety, and that the State should be responsible for staffing and maintaining them, has behind it an argument which certainly merits consideration on ethical grounds, viz., that national sickness ought to be a national charge and not dependent upon the uncertainty of charity. On the other hand, we are bound to look at the matter from the practical point of view, and, as rigid though wise economy must be exercised by the State in every direction after the war, it is difficult to conceive of the State taking over, on purely idealistic grounds, an organization which has, in the past, done such splendid work, and saddling itself with vast financial responsibility when the same practical results can be achieved by merely supplementing the efforts of the hospital.

The real crux of the question—the greatest difficulty in the formation of a national medical service—concerns the position of the general practitioner in this service, and the schemes which have been proposed always become hazy and indefinite at this point; yet it is this matter which affects the largest number of doctors. Quite naturally the general practitioner wants to know what is going to happen to the practice which he may have spent many years of his life in building up, and how his future prospects in this direction are likely to be affected.

The first question, therefore, to determine is the social scope of the service, *i.e.*, the persons to whom treatment under the service is to be available. Now there can be little doubt that no scheme can be regarded as national, or is likely to be established, which does not provide for the taking in of the poor law medical service. Every proposal which is made provides for this as an essential part of the scheme. Consideration will show that once this is admitted it is practically impossible to draw a line short of rendering eligible for treatment the whole community. The suggestion of fixing an income limit is not practicable. The difficulties of determining what that income limit should be, and of ascertaining the incomes of the many thousands of persons who are near it, and whether or not they are eligible, are insurmountable; and with the present low limit of income at which income tax begins, any attempt to fix the income tax limit as the standard would give rise to serious hardships and dissatisfaction. Space precludes detailed discussion of this question, but anyone who really studies it must ultimately come to the conclusion that no limit

to those who are entitled to the benefits of the service can be drawn. If this view is correct, it undoubtedly means a very substantial decrease in private practice, especially among the lower middle class and artizan class. Probably, in practice, a more or less broad distinction would grow up, just as exists in the educational system to-day, under which, while every person is theoretically entitled to send his children to the national schools, the wealthy classes, as a matter of fact, rarely avail themselves of the opportunity. Accordingly, the demand for compensation for loss of practice or purchase of practices by the State arises, and it would seem an equitable proposition that if the service is established such compensation should be paid, or doctors should otherwise be compensated by giving them the equivalent in salaries. But again, having regard to the probable state of the national finances after the war, it does not seem very likely that this will be done.

On the other hand, private practice, though it will be diminished in volume and will probably be less lucrative, will certainly not disappear, even among the working classes. Sir Bertrand Dawson has excellently stated the importance of individual effort from the doctor's point of view, and experience under the Insurance Act has clearly demonstrated the strong desire of the working classes to choose their own doctor. In former days, a certain amount of friendly ridicule was attached to what is known as the " bedside manner," but recent developments of psychological medicine have emphasized the great importance of a doctor being in full possession of the patient's confidence in a much larger number of ailments than was previously recognized, and the obtaining of this confidence depends solely on the personality of the doctor. It is this factor which explains the remarkable distribution of patients in panel practices, and affords the reason why, in many towns and districts, half the insurance work may be in the hands of a quarter or less of the doctors. Incidentally, it may be noticed that this tendency affords the greatest obstacle to any scheme which provides for whole-time salaried doctors being allocated to specific districts.

In these circumstances, it will be found that the ultimate object of all the schemes put forward is to reconcile in some form or other the continuance of private practice with a national medical service. The State Medical Service Association endeavour to get round the difficulty by providing a transition period, permitting for the time being private practice and salaried practice side by side, passing ultimately into complete salaried service. More support is obtained for the proposal of part-time salaried practitioners who are also allowed to do private practice. The objection which is urged most frequently against this system—and it would be foolish not to recognize, in many cases, with an element of truth—is that a practitioner will tend to devote more time and care to his private patients than to those who are treated under the service. Thus, in good class neighbourhoods, there would be considerable likelihood of the system extending, under which the private patient enters by a special door, has a more comfortable waiting room, and receives a longer interview from the doctor,

while the public patient is treated more or less on the old club lines, and may have to wait in a crowd for a brief consultation. This difficulty equally operates in any other system under which the practitioner is paid either for attendance or *per capita* for public patients, and is also doing private work. We have further to recognize that, in sparsely populated and in rural districts, very great difficulties would arise in attempting to determine the area or the particular persons for whose treatment the doctor was responsible under contract. Moreover, under any system, difficulties would arise as to how far the doctor was bound to supply medicines and appliances to his contract patients, a question the importance of which has recently been emphasized by the decision of the Insurance Commissioners that a panel practitioner is obliged to supply expensive sera if they are required.

There are numerous expedients or safeguards which can be suggested to obviate the most serious drawbacks, either to a whole-time salaried service or a part-time service, but, again, consideration will show that the difficulties which arise, and the proper steps to meet them, depend very largely upon the particular circumstances of the district. It is clear, for example, that the establishment of a whole-time salaried service in a district which is wholly of a poor class character does not present such serious difficulty as the establishment of a similar service in a mixed or good class district. In the first case, the emoluments from private practice are relatively low, often, as we know, in the poorest districts ranging from 1s. to 2s. 6d. an attendance. In such districts a whole-time service, with remuneration based upon a *per capita* rate, or a salary of equivalent value, would probably pay the doctor better than the present system. Indeed, there can be little doubt that, in the poorest districts, the doctor is deriving a considerably larger income per head from the insured class than from the class of private persons, and the extension of the medical service to take in all these persons, including paupers, would be substantially to his interest. Moreover, in such districts, there is little or no ground for making any distinction between private and contract patients. On the other hand, in good class neighbourhoods it is practically impossible for a doctor to carry on good private practice and insurance work or practice of the same nature as well, without making some distinction between his two classes of patients, even if he is, as is often the case, a thoroughly conscientious man and gives his contract patients just as much care and time as the rest; nevertheless, the drawing of certain distinctions as regards waiting-room, etc., is almost unavoidable.

The general point which it is sought to make is that, owing to the great variety and conditions from locality to locality, anything in the nature of a centralized uniform medical service is impracticable. It is impossible to conceive of satisfactory results following from a service which lays down the same requirements for a rural district of Sussex, a West End suburb of London, and a crowded industrial area of Wigan. An essential qualification for success is a wide degree of elasticity in accordance with local circumstances. It is submitted, therefore, that the best prospects of increasing the

usefulness of the general practitioner to the community will be afforded by dismissing the idea of a national medical service, and considering instead the idea of local medical services, which shall vary according to the needs and type of each locality.

In order that this scheme might be realized, it would be necessary in every district to establish a local authority on which the practitioners of the district would be widely represented. This need not necessarily be a new authority; it might, for example, be simply a sub-committee of the present sanitary authority, to which practitioners were added. But it should be understood that the doctors were not members of this authority simply for the purpose of protecting their own interests, but were to be regarded as actually responsible, along with the rest of the committee, in establishing an adequate medical service in their district.

The authority should then have an entirely free hand to survey its needs and provide for them accordingly. In some districts, as already pointed out, the practitioners would probably concur in a whole-time salaried service being formed; in others, it would be realized that the great bulk of the work was already being done by private practice and there was no need to interfere with this, but that it was necessary to supplement it in various directions. Again there would be freedom to make the additional provision either by the appointment of a certain number of whole-time men or of part-time men, or by payment of private practitioners by a capitation fee. Of course, this scheme would necessarily mean repeal of the Poor Law Acts, in so far as they relate to medical treatment, and also the repeal of the Insurance Act so far as it concerns medical benefit, and these are both steps of magnitude which will certainly not be taken without a great deal of careful consideration. But, whatever scheme is adopted, the consequent legislative changes will be very extensive; and in a position where any course is fraught with difficulties, and where weighty arguments can be brought forward against any proposal, it is the opinion of the writer that the minimum of difficulty and the best prospect of success will be attained by permitting a very high degree of local autonomy in this matter.

A very gratifying feature of the present situation is presented by the efforts towards constructive work, which are being made by the various medical committees and organizations concerned. In the unhappy days which marked the opening stages of the Insurance Act, medical activity was largely restricted to destructive criticism, often with a vigour of language which seriously detracted from the dignity of the profession. That phase has passed, never to return. The profession has now realized that to a large extent it must be regarded as the custodian of the nation's health; and in all the proposals made we now see appreciation of that fact, and attention directed, not only towards quite properly safeguarding the interests of the profession, but also to evolving schemes which shall be of the greatest benefit to the community from aspects both of prevention

and cure of disease.

One other change must be pointed out. The war undoubtedly has raised the status of the doctor. It has now been made clear to all that the medical profession must be regarded as an integral part of the national defence against aggression by foreign foe. Professional men of all types—lawyers, merchants, architects, teachers—have all worthily contributed their share as men; the *padre* and the doctor alone have been called upon to play their parts still in their professional capacities.

Nor is this change limited to increased recognition of his importance, for there can be little doubt that the actual value of the doctor as a curer of sickness has been substantially increased. Many a man has been taken from the quiet routine of private practice in a rural district or country town, and has been thrust into an activity which has necessarily called upon him to render himself familiar with all the latest knowledge and developments of his particular branch of professional work. Where formerly it may have been that his weekly medical journals accumulated unopened in his consulting room; now, at the mess, in hospital, or in the field, he has been associated with his colleagues, some perhaps high up in the scale of medical eminence, and he has had opportunities of hearing all forms of treatment discussed and has seen new developments of medicine put into practical application. There must be very few men who have not realized that, purely from the point of view of adding to their medical knowledge, they have benefited substantially by their experience in the Royal Army Medical Corps.

The future of the medical profession, despite all the uncertainties of the moment, is undoubtedly bright. The country is justly grateful to them for the part they have played in the war, and they themselves are better equipped to play their future part in civilian life. If those leaders of the profession who are discussing so earnestly the developments which peace must bring, maintain that dignity of conduct and breadth of outlook which they are now displaying, they will rightly justify the community in assigning to them a very important share in the safeguarding of the national welfare.

REFERENCES.

[1] *Brit. Med. Jour.*, July 13 and 20, 1918.
[2] *Lancet*, July 20, 1918.
[3] *Lancet*, April 20, June 8, June 15, 1918.

SOME RECENT WORK ON ANÆSTHETICS.

By J. BLOMFIELD, M.D.

Senior Anæsthetist to St. George's Hospital, etc.

THE gibe of Molière, to the effect that doctors poured drugs of which they knew little into bodies of which they knew less, seems to find hearty support, so far as anæsthetics are concerned, in an article by Dr. Cotton, of Toronto.[1] This authority finds that anæsthesia from commercial ether is due to various substances, not one of which is ether. "Ethyl ether, with which we are so familiar, is not an anæsthetic, and the analgesia which comes from the administration of commercial ether is not due to ether, but rather to the impurities occurring in it." This statement is based upon researches that have been in progress since 1915. The various chemical findings in the investigation of commercial ether were checked by clinical observations of the different derivatives recovered, and it was gradually recognized that of these some were irritative, some anæsthetic, and some toxic. The impurities causing irritation may be alcohols or acetones, which act ante-nasally, or aldehydes, which irritate the nasopharynx or bronchi. Aldehydes cause irritation in an ether dilution of less than ·1 per cent., and may be concerned with the causation of "ether pneumonia." The objectionable odours of commercial ethers are due mainly to organic acids. The substances derived from commercial ethers may be divided into two classes : (1) narcotics, producing peripheral congestion and drunkenness; (2) analgesics, producing loss of sensation and peripheral vasomotor spasm. Absolute di-ethyl ether will not anæsthetize. Its administration produces peripheral congestion and drunkenness. Prolonged inhalation causes muscular tremor, shortness of breath with expiratory grunt, a terrible sensation of impending danger and increased congestion. As much as 20 ozs. have been given to one patient with only this effect. If a small amount of carbon-dioxide is present, the patient enters anæsthetic and analgesic stages. To obtain anæsthesia proper, we must have acting a narcotic together with an analgesic, *e.g.*, di-ethyl ether and carbon dioxide. The writer maintains that the anæsthesia produced by this carbon-dioxide ether method is very similar to that due to nitrous-oxide, and is recovered from with almost equal rapidity. In practice it was found convenient to give the carbon-dioxide in solution with ether. The carbon-dioxide was injected into the ether under high pressure. Other narcotic substances that occur in commercial ethers are—

1. Alcohol, 2 to 5 per cent.
2. Di-methyl ether, almost to saturation, and traces of methyl-ethyl ether and methyl-propyl ether, the last three only in

ethers made from methylated alcohols.

Only a few of the ethers on the market contain carbon-dioxide in sufficient quantity to be of use, and, therefore, a further analgesic substance was looked for.

Absolute di-ethyl ether, on being passed through a certain process, was found to develop remarkable analgesic properties. With it operations were performed, with the patient just able to articulate clearly, without pain, and not sleepy. The symptoms were studied in over 200 cases. One case had 26 such administrations in one month, each lasting from 15 to 30 minutes. This patient was never nauseated by these anæsthetics, even though she had a meal shortly before. Careful concentration and extraction of gases from this analgesic product showed the presence of a gas with similar properties to those of ethylene (CH_2—CH_2), and of another gas not yet synthetized. This ethylene, as it was not present in the absolute ether base, must have developed in the process. Ethylene was then manufactured and added to absolute ether, and a similar analgesic product to that already described was obtained. It is therefore probable that ethylene is one of the analgesic substances for which we were looking. The writer goes on to claim that the anæsthetic power of a commercial ether depends upon the concentration in which ethylene is present in it. If it is sufficiently strongly present, then it is possible to make a patient lose all sensation before being made drunk by the narcotic solvents of the " ether." It is thus possible, he claims, to control sensation as well as narcosis. Discussing the essential nature of anæsthesia, the fact is recalled that analgesia may be brought about in some cases by the drawing of a number of deep, rapid inspirations. The so-called analgesic substances—ethylene, carbon-dioxide and other ether gases— when present in an ether, lead to rapid, deep inspirations. With regard to post-anæsthetic action the suggestion is made that the narcotic group of substances and carbon-monoxide, even if present in minute quantity, may be the causative agents.

The use of *anæsthetics in war surgery at the front* continues to provide much difference of opinion as to the best methods in cases of severe shock and hæmorrhage. Spinal analgesia, from which much was hoped, is on most hands regarded as disappointing and dangerous in these cases.[2] French anæsthetists have in this matter mostly supported the conclusions of their British colleagues.[3] Dr. Desplas,[4] however, is of opinion that spinal analgesia permits patients suffering from shock to be operated upon with more hope of recovery than when general anæsthesia is employed. His conclusions are drawn from only 571 cases; he employed Billon's stovaine. He lays stress upon slowness of injection and upon mixing the cerebro-spinal fluid with the stovaine in the syringe after first allowing 1 cc. of the former to escape. In the same journal Gwathmey[5] draws attention to the value in war surgery of *oral analgesia*. He finds that the performance of painful dressings gives a wide field for most advantageous use of this method. " An ideal analgesia is now available by the combination of morphine and oral analgesia in the advanced zone of warfare, and

of oral analgesia, morphine and N_2O and O in the other zones."
One great advantage of oral analgesia is that it permits the painful
dressing of fracture cases to be painlessly performed without the
necessity of moving the patient from his bed to the operating theatre.
The following combinations were tried :—

(1)	Ether -	-	-	-	-	} aa 20 cc.
	Liquid paraffin	-	-	-	-	
	Aq. menth. pip.	-	-	-		5 drops.
(2)	Paraldehyde -	-	..	-	-	5 to 15 cc.
	50 per cent. ether in albolene			-	-	20 cc.
	Aq. menth. pip.	-	-	-	•	5 drops.

The unpleasant taste of the mixture was overcome by a mouthful of
port wine just before and after. Paraldehyde was found to serve
no useful purpose. No special preparation of the stomach was
necessary.[6] In thirty cases the formula used had been :—

Chloroform	-	-	-	-	5 to 10 cc.
Ether -	-	-	-	-	} 20 cc.
Liquid paraffin	-	-	-		

Discussing the *toxic factors of some of the common anæsthetics*,[7]
Graham advances the view, discredited by many physiologists, that
the evil effects of chloroform are due to hydrochloric acid originating
in the body from the decomposition of the anæsthetic. He does not,
however, claim to have proved the presence of free hydrochloric acid
in the livers of animals, in whom late chloroform poisoning had been
experimentally produced. His conclusions are that anæsthetic sub-
stances yield toxic products indirectly by the formation of various
asphyxial acids and by favouring the formation and accumulation
of many toxic products of metabolism other than acids. Certain
anæsthetic substances, notably those which belong to the group of
alkylhalids, in addition are capable of yielding strong mineral acids
in the tissues as dissociation products. For example, chloroform is
broken down in such a way as to yield hydrochloric acid in the body.
The common anæsthetic substances are capable of dissociating in a
manner which yields bivalent or unsaturated carbon. The toxicity
of the cyanide and carbon monoxide probably depends largely on
their property of dissociating in a similar manner. It is therefore
probable that some of the effects of the anæsthetic substances are
due to their unsaturated residues.

The comparative efficiency of local anæsthetics has been subjected
to experimental investigation by T. Sollmann.[8] He points out that
the clinical desirability of a local anæsthetic depends upon its
anæsthetic efficiency and upon the slight degree to which it causes
local irritation or systemic intoxication. Further, experiments to
determine these qualities, which depend upon hypodermic injection
of guinea-pigs, are perforce of doubtful value, both owing to the choice
of animal and to the channel of administration. In his investigations
he left aside altogether the problems of irritation and toxicity, confining

himself to the determination of anæsthetic efficiency. The methods hitherto most widely used for this purpose are :—

    (1) Abolition of motor irritability of the frog's sciatic, immersed in the solution tested.

    (2) Failure of the frog, intact or decapitated, to retract the irritated foot, after its immersion in the solution.

    (3) Abolition of winking reflex after application to the cornea.

    (4) Abolition of sensation after intra-cutaneous injection in the human subject.

In addition to these methods Sollmann employed that of direct application to the sensory fibres of the sciatic trunk.

The sensory methods fall into two classes—

    (a) Application to mucous surfaces, illustrated by the cornea or frog's skin, and corresponding to the clinical use in the eye, nose and throat, urethra and bladder; and

    (b) Direct application to the nerves, either by injection or immersion of exposed nerves.

The relative efficiencies, as established by experiment, are depicted in a series of diagrams, and may briefly be summarized thus—

    1. For anæsthesia of mucous membranes, cocaine, beta-eucaine, alypin, and tropacocaine are the most useful. Alkalization increases the efficiency from two to four times; the mixtures, however, do not keep well and must be recently made.

    2. For infiltration and injection anæsthesia, cocaine, novocaine, tropacocaine, and alypin are equally efficient. Beta-eucaine and quinine with hydrochloride are intermediate; apothesin and potassium sulphite (or chloride) are inefficient. Efficiency is not increased by alkalization. Several of the synthetic substances can completely take the place of cocaine.

Local anæsthetics are preferred to all others[9] by R. G. Farr in the performance of abdominal operations of all kinds. Much time is saved by the use of a pneumatic injector. Novocaine is the anæsthetic preferred. For orthopædic operations Elmer favours ether and nitrous oxide and oxygen, and insists on the desirability of only light narcosis.[10]

REFERENCES.

[1] *Canadian Med. Assoc. Journ.*, September, 1917, No. 9, p. 769

[2] *Brit. Med. Journ.*, 1917, p. 722.

[3] *Presse Médicale*, February, 1918, p. 111.

[4] *Medical Bulletin*, April, 1918, p. 447.

[5] *Ibid.*

[6] *Brit. Med. Journ.*, March 2, 1918, p. 255.

[7] *Journ. Amer. Med. Assoc.*, November 17, 1912, p. 1666.

[8] *Ibid.*, January 26, 1918, p. 216.

[9] *Journ. of Surg., Gyn. & Obstet.*, November, 1917, p. 48.

[10] *New York Med. Journ.*, September 29, 1917, p. 591.

SCURVY.

By HERBERT VINCENT O'SHEA, M.B., B.Ch., B.A.O., L.A.H.I.

Late Resident Surgeon, Mercy Hospital, Cork ; late Senior Resident Physician, District Hospital, Cork ; late Temporary Lieutenant, R.A.M.C.

(*Concluded.*)

Heart.—The cardiac symptoms found in scurvy are generally due to the concomitant anæmia, and in severe and long-standing cases to degeneration of the cardiac muscle.

Tachycardia was seen in three patients. In one case, which lasted seven days, the cardiac rate was 130 beats a minute; after a few days it fell to 120, then to 115, until it gradually returned to its normal rate. The patient did not suffer any discomfort from the condition. The second case was more persistent and caused the patient considerable uneasiness, lasting well into convalescence, and was the last symptom to disappear. The highest rate reached was 140 beats per minute. The third case was only slight, lasting a few days, and producing no marked symptoms.

Bradycardia, associated with irregularity and pain over the præcordia, was present in one case. The rate was 40 beats a minute, and the condition lasted ten days.

Hæmic murmurs were often present, usually well heard at the base of the heart, but frequently mitral systolic bruits were present, in all probability due to valvular incompetence, the result of a certain amount of dilatation. In bad cases with severe anæmia, murmurs were heard over the entire præcordial area. All these symptoms and physical signs, which have been seen in one or other of the cases, disappeared with the recovery of the individual, except those cases in which the heart was the seat of organic disease. One patient, an old man, showed signs of cardiac degeneration ; he had fully recovered from his scorbutic symptoms, but eventually died from an attack of syncope some five or six weeks later. No post-mortem examination was made, for I did not expect to find anything of interest.

Respiratory System.—This system was not often affected; in a small number of cases bronchitis and emphysema appeared. Hæmorrhagic infarcts of the lung have been described. The following case is interesting, because, with one exception, it presented all the symptoms and physical signs of infarction of the lung. The one important symptom wanting was hæmoptysis.

The patient, aged 40 years, was admitted to hospital, supposed to be suffering from contusion of the knee, which was swollen, inflamed, and painful, with evidences of a large hæmorrhage around the joint. The knee was flexed, and the surrounding tissues quite hard. The gums were slightly swollen and inflamed. The patient complained of pain over the posterior surface of the left lung, coughed incessantly, and appeared to be very weak. Examination of the lungs revealed extensive bronchitis and emphysema. After seven days' rest under antiscorbutic treatment, his general condition was much improved, and the pulmonary symptoms began to be less evident, but the pain at the back of the lung still remained, though it was not so severe. Careful examination of this painful area revealed

dullness, bronchophony, tubular breathing, and other signs of consolidation, while just below this, and extending to the lower border of the lung in the direction of the mid-axillary line, the percussion note assumed a tympanitic character and the breath sounds were deficient or practically absent. There was no hæmoptysis at any time during the course of the disease, but there was an abundant expectoration of mucus; the temperature was normal from the beginning. The X-rays showed that the lung was consolidated in this limited area over which tubular breathing was heard.

It is possible in this case, that an hæmorrhage took place into the superficial tissue of the lung just beneath the pleura, for a pleuritic rub was present, and this may account for the absence of hæmoptysis. The hæmorrhage into the lung was probably due to the vessel-walls yielding before the increased pressure caused by the continuous coughing. The deficient breath sounds beneath the consolidated area may have been due to a localized hæmorrhage between the pleural layers, or to a partial collapse of the lung tissue. I did not aspirate, so cannot tell the exact condition. The tympanitic note heard at the base towards the axillary line may have been due partly to skodaic resonance and partly to a stomach note.

Another patient, who was suffering from scurvy and bronchitis, one day suddenly developed dyspnœa and pain over the posterior surface of the base of the lung. He was cyanosed, his respirations were doubled, and a distressing cough was present, but no hæmoptysis. His temperature reached 100° F., but dropped the following morning to normal and remained slightly irregular for five or six days, after which time it remained normal. He had no rigor, and examination of his blood for the malarial parasite proved negative. The lower half of the affected area of the lung was dull on percussion, and the breath sounds were deficient or absent; above this area, the breathing was normal or slightly tubular. The patient had to be supported in bed in the sitting position, so that he could breathe easily. X-ray examination showed a slight shadow over the lower part of the lung, the upper surface of the diaphragm was ill-defined. The patient gradually recovered, and as the breath sounds became more audible, a pleuritic rub could be heard over parts of the lungs.

This appears to have been a case of hæmorrhage into the pleural cavity, but I did not aspirate. Sanguineous effusions into the pleura have been known to occur in some cases.[1]

Ocular Symptoms.—The scorbutic symptoms seen in connection with the eye may be classified into two groups :—

(a) Those showing interference with the visual power, for which no apparent cause can be found, and must be attributed to the anæmic condition of the blood and the debilitated state of the patient;

(b) Those due to hæmorrhage.

Under the first heading a peculiar condition, known as " night-blindness," is described: objects are seen clearly during the daytime or in a bright light, but, as soon as the light fades and darkness comes on, they become invisible, or are seen with difficulty. The reverse of this condition may occur, and constitutes what is called " day blindness." Examples of both these conditions were present in this series. Examination of the interior of the eye in every case

was negative, proving that these disturbances of vision were purely functional; they are supposed to be due to the anæmia causing a loss of power in the rods and cones of the retina.

It appears that ocular defects, which are so slight as to cause no inconvenience in health, may manifest themselves in a patient debilitated by scurvy. One patient, in addition to having well-marked scorbutic symptoms, was very anæmic and complained of headache and pain in the eyes; examination showed that he was slightly astigmatic. He said it never troubled him until he became ill; as he had no special treatment for this condition beyond anti-scorbutic diet and made no further complaint, I presume that the symptoms ceased to trouble him as his health improved.

The only part of the eye proper, in the series, which was the seat of a hæmorrhage, was the outer coat. A large hæmorrhage occurred on two occasions beneath the conjunctiva, in one case occupying the inner quadrant of the eye, while in the second the outer quadrant was involved. The hæmorrhage was a deep red colour, sharply defined, and completely hid the underlying choroid.

Retinal hæmorrhage has occurred in scurvy, but experience of these cases showed it to be very rare. Twenty-two of the worst cases were examined ophthalmoscopically under homatropine, including those cases showing subconjunctival hæmorrhage, but in no case was any hæmorrhage into the medial or fundal structures discovered. In three cases the arteries appeared abnormally pale, presenting less definition than normal, but no arterial lesions of any kind were observed, such as exudates, œdema, or hæmorrhages. In one case stippling of the fundi, suggestive of early choroidal endarteritis, was visible, but was certainly not connected with the scorbutic condition.

One patient had a large hæmorrhage into the upper eyelid, probably brought on by paroxysms of coughing, which he frequently had. The only other symptom of scurvy present was a slight sponginess of the gums. Blepharitis, with an accompanying conjunctivitis, was present in another patient with well-marked scorbutic symptoms.

The Skin.—Scabies is sometimes seen in cases of scurvy. In connection with this disease, it is important to remember that the scaly skin, sometimes seen in scurvy, is often very irritable, with numerous papules spread over the surface. The patient naturally starts scratching to relieve the irritation, with the result that he causes the papules to become petechial, and produces wheals; it is then often difficult to tell whether scabies is present or not, in addition to the scorbutic condition. This was seen in some cases, but proved to be purely a scorbutic symptom.

Furunculosis was present in another scorbutic case, in which a large number of boils occurred on the right forearm; these coalesced and became petechial, breaking down into an ulcerating surface, and resembled weeping eczema. Hæmorrhage has occurred into scar tissue, while in other cases the remains of several small circular ulcers on the legs became engorged with blood, forming large blebs which burst and caused considerable hæmorrhage. In some cases scorbutic ulcers have followed knocks or other injuries to the skin;

these ulcers were quite extensive and presented a dark red surface, easily bled, and took an appreciable time to heal. Sloughing of the skin has occasionally been seen.

Urinary System.—The changes in this system are by no means constant, and in a large number of cases there is no apparent change at all. Hæmaturia occurs in some cases, and albuminuria is frequently present; the specific gravity is usually high. The constituents of the urine vary greatly, and the statements of the different authorities with regard to the inorganic contents are not consistent. Some state that phosphates and potassium salts are decreased, while others maintain that these salts are present to a greater extent than normal.

I made a careful examination of the urine in a series of 60 scorbutic patients, with the following results :—

Table of Analysis of Urine (60 *Cases*).

Colour.—Darker than normal in nearly every case, but no specimen had the smoky appearance of blood.

Specific Gravity.—Varied from 1,015–1,035.

	Acid.	Alkaline.
Reaction - - - - -	53	7
Blood and albumen - - -	9	None.
Albumen (only) - - -	5	None.
Phosphates - - - -	None (naked eye)	7
Casts - - - - -	None.	None.

No blood was seen with the naked eye, and the red blood corpuscles were only seen in small numbers under the microscope. Each specimen was centrifuged before microscopical examination. The above table shows that :—

1. Hæmaturia did not occur very frequently, 15 per cent. in the series. In those in which it was present it was so slight that recourse had to be made to the microscope to detect it.
2. Albuminuria occurred fairly frequently, $23\frac{1}{2}$ per cent., but it was only slight in amount.
3. Casts were not found in any cases.
4. The low percentage ($11\frac{2}{3}$ per cent.) of alkaline urines with precipitation of phosphates.

Osseous System.—Necrosis has been known to have occurred in some cases in which the disease had reached an advanced stage, though, personally, I have not seen it. There have also been instances of separation of the cartilages from the sternum. Ten cases of chondro-sternal hæmorrhage have occurred in this series. The hæmorrhage was accompanied by distinct swelling, which was very tender on pressure. In one case the swelling was larger and more painful than the others, and a slight crepitus was heard under the stethoscope when the patient took a deep breath; this may possibly have been a case of separation of the cartilages from the sternum. In another case there was a large swelling at the junction of the first rib with the sternum, and a smaller swelling at the manubrio-

sternal joint, with a distinct fissure between these two parts of the sternum. Tenderness on pressure was present in both of these situations, but there was no discoloration of the skin in any of the cases. Tenderness alone was frequently present over different parts of the ribs, but no physical signs were to be seen.

In infantile scurvy, fracture of the bones has occurred, and a somewhat similar condition to this may take place in adults, in whom the callus of a recently healed fracture has been known to undergo destruction.[2]

Arthritis has been described as an occasional complication. In some instances, in which the knee was deeply involved, arthritis may have been present, but could not be detected. It is interesting to note that these cases were admitted as suffering from rheumatism.

Nervous System.—Headache is sometimes present, and is occasionally accompanied by a certain amount of mental depression. This condition is best seen in pronounced anæmic cases of long standing, in which there are extensive hæmorrhages, and an intermittent temperature is present; the skin in these cases assumes a somewhat sallow, earthy tint, and jaundice may be seen. In very bad cases, delirium is said to occur in the later stages.

Instances have been described in which convulsions, hemiplegia, and meningeal hæmorrhage have occurred, but these were rare. Sanguineous effusions into the meninges have also been recorded.[3] In none of these cases could I find any evidence of a lesion of the nervous system due to hæmorrhage, the reflexes in every case were normal. A few cases from another series were reported to me in which the knee jerks were absent or decreased in one or both legs. Unfortunately, the details of these cases were not available, so I am unable to give full particulars.

The importance of examining the reflexes is pointed out by Nocht,[4] who believes that scurvy is closely related to " ship beri-beri," which frequently occurs on the Scandinavian sailing ships. This disease resembles true beri-beri of the wet type, but the symptoms of neuritis are absent. He gives as his reason for stating that scurvy and ship beri-beri are closely allied, the fact that he found sore gums and hæmorrhages into the muscles in some of his cases; he also notes that even in true scurvy there may be cases of dropsy without spongy gums and hæmorrhages. At least one case in the series presented well-marked dropsy of the lower extremities without any signs of hæmorrhages into the muscles and only slight soreness of the gums; examination of the urine in these cases for evidence of renal disease was negative.

Scorbutic symptoms are occasionally seen in epidemic dropsy, which is a disease of the tropics.[5] Several cases of malaria presenting scurvy symptoms have been seen. In these cases the gums were painful and spongy, while purpuric hæmorrhages and hæmatomata were present.[6] Castellani pointed out that, although in a large number of these cases the malarial parasite could not be found, they all got well under quinine treatment. One such case came under my notice. The patient was suffering from malaria, but, on examination,

his gums proved to be slightly spongy and painful, while he had a large area of purpuric hæmorrhage around each ankle. However, I was inclined to believe, from the history of the case, that the scorbutic condition was entirely independent of the malarial infection, and I put him on anti-scorbutic treatment in addition to the quinine.

Anæmia.—This symptom was frequently seen and was well-marked in some cases, while, in others, it was present to a slight extent only, or entirely absent. In every case, the degree of anæmia present did not always bear a constant relation to the severity of the other symptoms of the disease. I have seen very bad anæmia, clinically, in cases which showed slight scorbutic symptoms, and *vice versâ*. Microscopical examination of the blood in these cases shows the features of a severe anæmia, but with the absence of leucocytosis. This point is important, for it is sometimes necessary to exclude acute diseases of the blood with stomatitis and hæmorrhages.

SITE OF WOUNDS.

Several patients had been wounded some time or another, and it was noticed in the majority of cases that a hæmorrhage occurred at the site of the injury. In one case, the patient, two years previously, had been shot through the lower third of the humerus, the bullet entering at the inner side of the elbow, and no exit wound was visible; the wound healed, and the patient returned to his duties. Later, when he developed scurvy, a swelling, which gradually attained the size of a hen's egg, appeared, occupying the upper half of the ante-cubital fossa; the swelling was tender and prevented full extension of the arm, but the overlying skin was of normal appearance.

X-ray photographs were taken, and the presence of an old united fracture, with several pieces of shrapnel around the bone, was discovered. One piece of shrapnel, larger than the others, was surrounded by a dark area corresponding to the size of the tumour. On making an incision over this area, a large hæmatoma was discovered, with the piece of shrapnel in the centre. The fragment was removed, the cavity drained, and the wound healed by first intention. In another instance, the elbow, which had been injured some time previously by a gunshot wound, was the seat of a large hæmorrhage.

Contrary to what might have been expected, scorbutic cases when operated on showed no particular tendency to hæmorrhage, the incision healing quite rapidly and forming a good scar.

MALINGERING.

This has occurred in epidemics of scurvy, especially among the armies in the field. The disease is feigned for the purpose of being admitted to hospital, and so enjoying a rest and the many other privileges accorded to patients. I have met with one case of this kind, and the scorbutic symptom feigned in this instance was a purpuric hæmorrhage of the skin occupying the entire inner surface of the thigh. The real condition was very well simulated, and had evidently been copied from a patient's leg. The hæmorrhage

was imitated by drawing a very fine network of venules over the skin with an indelible pencil, and then sponging the whole surface lightly with some wet cloth or sponge, with the result that the skin was stained a purplish or blueish tint while at the same time the venules were visible. Tenderness over this area was also complained of, but the complete absence of swelling or hardness of the tissues, which would have been present if the hæmorrhage had been genuine, made me suspicious. These suspicions proved to be correct by the fact that the entire discoloration of the skin and the venules were all washed away quite easily with soap and water.

COMPLICATIONS.

These are few, and require just a passing mention. In addition to those already mentioned earlier in this article, I have found bronchitis, dysentery, and malaria to be the most frequent.

DIAGNOSIS.

Scurvy is easily recognized when it occurs in epidemics, but in isolated cases, particularly with extensive ecchymosis of the skin and hæmorrhage, the disease is likely to be mistaken for purpura; but the association of the disease with poor diet, etc., confirms the nature of the illness.

Atypical forms of pellagra sometimes occur, in which the skin lesions are absent and scurvy may be simulated, but, as a rule, the absence of nervous symptoms in the latter disease leaves no doubt about the nature of the case.

PROGNOSIS.

This is nearly always good; unfavourable symptoms are severe dyspnœa, syncope, scanty urine, and elevation of temperature. Death is usually due to gradual heart-failure, though in some cases a fatal syncope occurs; large hæmorrhage into the meninges and serous cavities and other complications may bring about death. The prognosis is grave when dysentery intervenes.

PROPHYLAXIS.

Little need be said about this, except that care should be taken to see that each individual has a sufficient amount of antiscorbutic articles of food in his diet; when fresh meat and vegetables cannot be obtained, lemon juice, lime juice, or oranges should be taken regularly; in this way scurvy can be avoided.

TREATMENT.

This may be of two kinds: (a) dietetic, (b) medicinal. The dietetic treatment may suffice alone in mild cases of scurvy, but frequently the existing stomatitis requires active medicinal treatment, quite apart from the constitutional symptoms which may be present. The dietetic treatment consists in giving the juice of two or three lemons or oranges daily; some patients prefer the whole fruit, which is permissible if no gastric irritation is present. Lime juice may also be given, diluted and sweetened, and patients find it a refreshing drink, especially in hot weather. A plentiful diet, with fresh meat

and green vegetables, is essential, and this treatment alone will cure mild cases. My patients were usually given an ordinary diet, to which were added one lemon, one orange, two ounces of lime juice, and from two to six ounces of fresh green vegetables.

In some cases, when the patient is very weak and the stomach irritable, a fluid diet may be necessary at first, and should be taken in small quantities and frequently. Meat juice, milk, and sips of lemon juice should be given in such cases, and gradually increased until something more solid is tolerated; then, as the patient gets stronger, meat, potatoes, cabbage, etc., may be added to the diet.

As regards medicinal treatment, the symptom which calls for immediate attention is the stomatitis. A large variety of mouth washes may be tried. I have obtained good results by using a weak solution of hydrogen peroxide when the gums are ulcerated and contain a large amount of pus, due to septic infection; when the gums are very painful and tender, diluted carbolic acid solution is very soothing, and a mouth wash of permanganate of potash is very beneficial in the majority of cases. Pencilling the swollen gums with a strong solution of silver nitrate is recommended, but I have no experience of this treatment.

The anæmia and general weakness is best combated by a mixture of iron, arsenic, and strychnine, which hastens the recovery of the individual considerably.

In bad hæmorrhagic cases, acting on the view that the coagulability of the blood is diminished, I give calcium lactate in doses of 30 to 40 grains daily in addition to other drug treatment. Unfortunately, I was unable to make a close study of the therapeutical value of this drug, so cannot express any definite opinion, but from what observations I was able to make on those cases in which the drug was administered, as compared with those in which it was not, I am inclined to believe that it has some slight beneficial effect, even if only in preventing any further extension of the hæmorrhage. It was certainly successful in permanently arresting hæmorrhage from spongy, inflamed gums; the bleeding in this case had been continuous for three or four days before calcium was given.

When the legs are very swollen, painful, and the seat of large hæmorrhages, rest is necessary at first; as the condition improves, the patient may walk about gradually, but it is well to use a crutch or stick to keep the full weight of the body off the limb, otherwise recovery may be considerably delayed. Small doses of iodide of potash aid the absorption of the large hæmatomata which are often present.

Constipation is best treated with mild aperients, or, if necessary, large enemata. For other conditions, as they arise, suitable treatment must be adopted.

REFERENCES.

1 Saville: *System of Clin. Med.*, page 590. **2** Osler: *Prin. and Prac. of Med.*, page 448. **3** Saville: *System of Clin. Med.*, page 5. **4** Stitt: *Trop. Dis.* **5** Manson: *Trop. Dis.* **6** Castellani: *Lancet*, July 16, 1917.

ERGOT AND THE PROSTATE.

By OSWALD Y. MURPHY, M.B., B.Ch., B.A.O.

Acting Colonial Surgeon, St. Helena.

At the present time, when surgeons claim for surgery any case which lies on the border line between surgery and medicine, I hope I am not out of date if I urge that cases of prostatic enlargement and inflammation should be given a more frequent trial in the hands of physicians. The first case I draw attention to would, at home, undoubtedly have been operated on at once and the prostate removed; the second case I have no doubt would have been treated medicinally.

CASE I.—I was called to see a man, S. Y., æt. 78, who up to this attack was most active. He was, he said, suffering from retention of urine, pain over region of bladder and in perineum, and pain during defæcation. With difficulty I passed a silver catheter, and ordered him to hospital, where he gave a history of previous milder attacks. Concerning the present attack, it first started by dull pain in the perineum, pain on defæcation, frequency of micturition, and pain at end of the act especially.

Rectal examination revealed a generally enlarged and tender prostate—smooth and hot; urine removed by catheter was cloudy and had a fishy odour, there was hæmaturia. T. 100°·2, P. 112, bowels confined.

I considered it a case of long-standing prostatic enlargement, aggravated by some chill or strain. I put him on a mixture of hexamine grs. 8,

tr. hyoscyamus m. 30, liq. potassæ m. 20, infusion buchu ad ʒss, in water every four hours; liquid diet; the bowels were regulated by mist. senna co. ʒii. Morning and night he had hot sitz-baths, and in addition fomentations over bladder and perineum; it was necessary to give a sleeping draught at night. I had to pass the catheter three times a day, and morning and evening this was followed by irrigation of the bladder with boric acid solution. The cystitis started clearing up satisfactorily, but the temperature remained unsettled, catheters were necessary, and the prostate was still tender.

I now stopped the mixture, and placed him on liq. ext. ergotæ ʒi every four hours ; after four days there was a decided improvement in his condition, and finally after ten days the use of the catheter was dispensed with. He was in hospital five weeks, during the last two of which he was on ergot only. He continued the ergot after he was discharged, in May, 1917, for two weeks, taking ʒi morning and night.

To-day he is as active as he was previous to the attack, and has had

no prostatic trouble, though there is a permanent enlargement.

CASE 2.—G. E., æt. 23, came complaining of pain in bladder region and inability to pass water and a glairy discharge. He gave no history whatever, except of a bar striking him in the perineum, and pain with defæcation. Prostate was tense and hot; no abscess. I discovered no traces of gonococci in the discharge. T. 101°·4. I had to pass a catheter, and the urine was fœtid, dark, cloudy—hæmaturia. I placed him on a mixture similar to the last and ordered baths and fomentations.

During the ensuing two weeks the catheter had to be passed nearly every day once or twice, but the bladder trouble subsided quickly.

As in previous case, I now put him on ergot four-hourly, with the addition of tr. ferri perchlor. ℳ. viij, aq. chloroform ad. ℥ss, and by the time he had finished a 12-oz. bottle he had recovered in every way; the prostate had returned to normal, and the discharge ceased.

It is of interest to note that in these cases, one a senile enlargement and the other a traumatic inflammation in a young adult, the administration of ergot apparently reduced the obstruction caused by the enlarged prostates.

I know ergot has been tried in prostate cases with only indifferent results, so much so that in elderly cases operation is customary; but I hope the happy results attending its use in the above two cases— the only ones I have had out here—will induce a further trial of this drug.

———————➤●◆●◆←———————

PSEUDO-ACUTE ABDOMEN—WITH TEMPORARY INCREASE OF ARTERIAL TENSION.

By W. B. COSENS, Major R.A.M.C.

Medical Officer in Charge, Prisoners of War Hospital, Dorchester.

SEVERAL of these cases have come under my observation, and in my opinion the whole phenomena is due to nerve stress so common amongst soldiers.

The following only refers to men below the age of 35, the increase of blood-pressure being a temporary symptom, the physical signs, as a rule, completely subsiding in four days.

Physicians have drawn attention to the gastric crises due to the condition of arterial sclerosis, and not uncommon in general practice amongst elderly people.

The cases now considered suffer from an increase of arterial tension, but not, I believe, depending upon a pathological change in the walls of the blood-vessels—simply a symptom of brain disorganization bearing the somewhat unscientific name of neurasthenia.

This generic term is so inclusive that our neurologists must soon differentiate, and place this disease under various headings, such as Abdominal N., Cardiac N., Peripheral N.

We have yet to learn what has injured the rhythm of the nerve centres—the criticism will probably be that they are all cephalic in origin, with varying symptoms; no doubt this is so, but now the greater and lesser cases are embraced under the same diagnosis, the multitude differing in clinical particulars, as in any other disease of the nervous system.

I have been invited, and almost tempted, to open an abdomen, the symptoms pointing to some acute trouble; but the character of the radial pulse and the accurate measurement of the blood-pressure has saved me from a futile exploration and a grave error in diagnosis.

The symptoms are general distress, moderate pain in and great distension of abdomen (palpation is almost unnoticed if the patient's attention is occupied), with an absence of real resistance; sometimes diarrhœa, or constipation, possibly an inability to void urine, or often a frequency of micturition; pupils slightly dilated; moist skin, occasional sweating, vomiting, more often retching only. Urine occasionally contains a trace of albumen; patella reflexes; blood-pressure shows anything between 160 to 200 mm.; pulse 120 to 130; temperature 99°·4 to 100.

This is the clinical picture common to all.

Diagnosis requires the exclusion of acute sepsis, stomach or

intestinal perforation, obstruction, the crises of tabes, reflex pheno-
mena from otitis media, hernia, mesenteric thrombosis, and abdominal
contusion, leading to intestinal stasis. The latter possibility must
not be ignored amongst a large number of men, who, on occasion,
surreptitiously take the " law " into their own hands.

The nervous condition of the patient differs so in character from
the facial anxiety and dominating pain found in acute abdomen, in
fact, observation alone would put the surgeon on the right track.

The definite increase of blood-pressure and the fact that tincture
of strophanthus administered in 5 minim doses every three or four
hours with the positive assurance of his recovery, will at the end
of 24 hours rid the patient of most of his objective symptoms.

I look upon these cases as simply one of the varieties of brain
storm, closely allied in character to migraine, or the reflex phenomena
in middle ear trouble—not a disease in itself, but one of the many
conditions occurring in the neurasthenic, the causation being the
same, namely, a loss of control, or rhythm, of the brain centres.

If surgeons will recognize the possibility of this class of case, they
will save their reputation and their mentally unstable patient, the
risk of submitting to a major operation which must draw a surgical
blank, and add yet another blow to the already disorganized nervous
system.

Practical Notes.

TREATMENT OF GONORRHŒA WITH SULPHUR DI-OXIDE.

Lacombe points out that the bactericidal effect of the antiseptics usually employed does not reach the gonococci in the depths of the mucous membrane of the urethra. He reports on the successful results obtained in the treatment of over 100 cases by exposing the urethra to sulphur di-oxide under slight pressure. The gas is obtained by mixing solutions of picric acid and hyposulphite of soda. Solution A contains 6 g. of picric acid in 1 litre of water; Solution B contains 17 g. of hyposulphite of soda in 1 litre of water. For use, 4 cc. of A are mixed with 1 cc. of B, and the mixture is then injected into the urethra. The two liquids decompose, soluble picrate of soda being formed, sulphur di-oxide evolved, and some sulphur precipitated The temperature of the body is sufficient to cause the gas to be under slight pressure, and to force it into the numerous lacunæ of the urethra and act upon the gonococci.—(*Presse Médicale*, January, 1918.)

SALINE SOLUTIONS IN GASTRO-INTESTINAL ATONY.

Hayem recommends the following for use in gastro-intestinal atony. They are based upon the composition of the waters of Châtelguyon :—

(a) Bicarbonate of soda	- - - -	-	2 g.
Sodium chloride,			
Magnesium chloride (crystallized)	-	- of each	2·50 g.
Distilled water -	- - -	-	1 litre.
(b) Sodium sulphate -	- - -	-	3 to 5 g.
Sodium chloride,			
Magnesium chloride (crystallized)	-	- of each	2·50 g.
Distilled water -	- - -	-	1 litre.

These have been found specially useful in cases of dilatation of the stomach due to myasthenia with or without decided muscular atrophy, and in the absence of any mechanical obstruction to emptying the stomach. Such cases are generally hypopeptic, and more or less advanced atrophy of the glands is present. Most patients suffer at the same time from intestinal atony, and for these the first prescription will be found most serviceable. If the constipation does not yield to this, good results will be ensured by giving the second.

Magnesium chloride appears to have an effective action upon the musculature of the digestive tube, provoking contraction in it, and making it regular in action.—(*Journ. de Méd. et de Chir. prat.*, July 10, 1918.)

CALCIUM CHLORIDE ASSOCIATED WITH HYPNOTICS.

Aymes, in a recent communication, reported the results obtained in some forms of convulsions by combining chloride of calcium with certain hypnotics, the action of which, taken alone, is much less efficacious. He had observed

in patients under treatment for convulsive psycho-neuropathic attacks, so frequently the result of the emotions and shocks of actual war, that the frequency and severity of the attacks were related to a certain amount of cerebral excitement and emotional instability, of which insomnia or dreams appeared to be a clinical expression. He adopted the simultaneous administration of calcium chloride, recommended as an anti-convulsive by many writers, and an effective hypnotic—for the latter making use of di-allyl-malonyl-urea, known as dial. The doses given were 2·50 g. of calcium chloride and 0·15 g. of dial each day for five days. The results of the combination compared most favourably with those obtained when the hypnotic drug was given alone. Not the least ill effect followed the treatment.—(*Journ. de Méd. et de Chir. prat.*, August 25, 1918.)

A SIMPLE TREATMENT FOR BOILS.

Kritzler recommends, in the early stage of a boil, painting the spot with collodium acidi salicylici. The pain is relieved at once, and the layer of collodion forms a comfortable application. The softening effect on the skin of the salicylic acid promotes a cure. The treatment is particularly suited to the obstinate boils on the neck caused by friction of the collar.—(*Correspondenz-bl. für Schw. Aertze*, August, 1918.)

TREATMENT OF BUBO.

Couanet treats buboes, due to soft chancres, by aspiration, followed by an injection of colloidal copper. He uses a fair-sized needle, 2 mm. in diameter, which he inserts into the periphery of the swelling, carefully avoiding the centre in order not to risk the eventual production of a sinus. He aspirates from 2 to 10 cc. of pus, withdrawing it very slowly so as to avoid any hæmorrhage from the inflamed tissues. The cavity is then washed out with hot normal saline solution or is injected with from 2 to 5 cc. of colloidal copper. The aspiration is continued daily or every other day according to the amount of suppuration, but the injection of colloidal copper need not be given each time. Complete recovery is obtained in from seven to fourteen days. Usually six injections are sufficient. The advantages of this method of treatment are quickness and certainty of application, absence of scar, and rapid result.—(*Journ. de Méd. de Bordeaux*, August, 1918.)

Reviews of Books.

Typhoid Fevers and Paratyphoid Fevers (Symptomatology, Etiology, and Prophylaxis). By H. VINCENT and L. MURATET. Pp. 303. London : University of London Press. 6s. net.

THIS is a well-written monograph, the arrangement of the subject matter good, and the whole very readable; the style is didactic and the issue is not obscured by multitudinous references to the literature. The first part gives a clear and accurate picture of the three diseases which leaves nothing more to be said. The mass of material which has come to hand in the course of the last three years has shown the close similarity between the manifestations of typhoid and paratyphoid infections and the gravity of the latter, These points are thoroughly brought out, and mark a decided progress in our knowledge. Paratyphoid fevers can no longer be looked upon as mild and comparatively unimportant diseases, but are as much to be dreaded as their prototype in their immediate effects as well as in their complications and sequelæ.

Unfortunately, the chapter on Diagnosis is far below the standard of the rest of the work. It is the intention of the authors to be concise, but here they have carried conciseness to an extreme, and some mention of Trench Fever and allied conditions might well have been made in considering the clinical diagnosis. The account of the laboratory methods employed for the detection of these fevers is very scanty and narrow in its scope. Stress is rightly laid on the essentially septicæmic nature of the infections and therefore the value of blood cultures, but this they exaggerate. That in vaccinated persons " no value should be attributed to the agglutination test " is a sweeping statement quite unjustifiable in the present state of our knowledge. Dreyer's agglutination technique and Marris's atropine test are passed over in silence where room is found for the typho-ophthalmic and splenic reactions, and even the opsonic index is revived. Finally, there is one grave error in the table on pp. 114 and 115, where B. typhosus and B. paratyphosus A and B are stated to produce acid in a lactose medium, whereas the contrary is the truth; nor does B. typhosus cause any acid production in dulcite.

Epidemiology, Ætiology, and Prophylaxis receive their full share of attention. Serum and vaccine therapy is judicially treated, and the chapter on vaccine prophylaxis is very interesting and instructive. Altogether the book should prove of very considerable use to the young practitioner or one who has had but little experiences of these diseases, especially in such times as he is debarred from the assistance of a skilled bacteriologist.

Human Intestinal Protozoa in the Near East. By Temp. Lieut.-Col. C. M. WENYON, B.Sc., M.B., and Temp. Capt. F. W. O'CONNOR, M.R.C.S., L.R.C.P. Pp. 218. London : John Bale, Sons, and Danielsson.

THE subject-matter of this book is the outcome of an inquiry into some problems affecting the spread and incidence of intestinal protozoal affections of British troops and natives in Egypt. It includes an investigation of the carrier-problem of amœbic dysentery among troops with a view to the possible elimination of the carriers, an inquiry into the emetine treatment of carriers, and an examination of the possibility of fly-transmission of amœbic dysentery. The methods employed are fully detailed and will be found useful to

laboratory workers. With reference to the first-named investigation, it is considered impracticable to examine large bodies of healthy troops with a view to the elimination of carriers of *E. histolytica,* and that the introduction of amœbic dysentery into England at the present time is unlikely. As regards treatment of amœbic carriers with emetine, three methods were tested : (1) daily one-grain injections, (2) daily one-grain doses by the mouth, and (3) daily one-grain injections, together with half-grain doses by the mouth; in all cases the treatment was continued for 12 days. The best results were obtained by the combined injections and oral administration. As regards transmission of amœbic dysentery by flies, this seems to be possible, for flies were found to be capable of taking up free and encysted forms of protozoa and to deposit these in their droppings. Cysts of *E. histolytica* were found to survive for a month in water, but to be killed instantly by drying. Some new species of protozoa are also described. *Entamœba nana* is a small amœba formerly regarded as being possibly a stage of *tetramitis,* but now proved to be a new species. The work has been carried out under the auspices of the Medical Advisory Committee, M.E.F. and is a valuable contribution to the parasitology and epidemiology of intestinal protozoal affections. The book is well printed, and is illustrated with several plates and figures in the text.

Fracture of the Lower Jaw. By L. IMBERT and P. REAL. Edited by J. F. COLYER. Military Medical Manuals. Pp. 189. London : University of London Press. 6s. net.

FRACTURES of the mandible must form a very high percentage of the total number of war injuries where trench warfare prevails. In this work two French dentists give a comprehensive survey, illustrated by many drawings, of the outcome of their experience in the care of this form of war wounds. One of the first essentials in the treatment of these cases is to secure clear and accurate skiagrams of the seat of injury. The authors indicate their belief in this principle by the number of skiagrams they include among their illustrations, but the account of their method of technique does not lead us to believe that French radiologists have yet attained to the standard of the workers in our military hospitals such as those at Sidcup and Millbank. The authors express a very strong opinion that the treatment of these cases should be by means of dental splints whenever possible, and claim 90 per cent. of satisfactory unions by this means. They consider that surgical intervention should only take place where pseudoarthrosis has become definitely established. Both wiring, plating and bone-grafting are discussed The authors do not consider that the success of the bone graft is yet established, but give a brief, but useful, summary of the various methods for this operation which have been utilized in France. As lotions, the authors recommend permanganate of potash 1–800 and silver nitrate 1–20,000 ; they also administer calcium salts internally. The book closes with a chapter upon " The Assessment of the Disablements Consequent upon Fracture of the Mandible," which should prove useful to officers employed upon pensions and invaliding boards, although, as the authors observe, it is too early yet to determine the permanent effects of these lesions.

Rules for Recovery from Pulmonary Tuberculosis, a Layman's Handbook of Treatment. By LAWRASON BROWN, M.D. Second edition. Pp. 184. Philadelphia : Lea and Febiger. $1.25.

THIS excellent little book has been designed and written for the careful study of phthisical patients with mature intelligence. It gives the whys

and wherefores of the many rules whereby these patients are commanded by their physicians to live. Beginning with an introduction to the subject and a summary, it is divided into 25 short chapters, each dealing with a subject of importance to the consumptive patient. It is clearly and persuasively written, and not overburdened with either facts or orders. We recommend it strongly to the attention of all intelligent phthisical patients.

Diseases o the Heart. With a chapter on the Electrocardiograph. By FREDERICK W. PRICE, M.D., F.R.S. Pp. 472. London: Henry Frowde, Hodder and Stoughton. 21s. net.

IN his evident desire to place before his readers a succinct, and, at the same time, a comprehensive account of cardiac disease in the light of modern knowledge, Dr. Price has certainly succeeded. While the author is not slow to acknowledge the contributions of others to the study of his subject, there is a strong personal note throughout the book, founded on clinical observation and laboratory work.

In Chapter 2, on Physical Signs, the various percussion and auscultory sounds are described, emphasis being laid on the more important points by the use of italics. The chapters on the Arterial Pulse and on Blood Pressure are excellent, but it will be to Chapters 7 to 10 that the busy practitioner will most frequently refer. The first of these on Heart Failure being specially complete. The author's disagreement with the term, except in individual cases where "the standard of the heart's strength is below the normal," is opportune, for it is surprising how many conditions totally unconnected with the heart, this expression is allowed to cover—from a cloak for idleness, to addiction to aclohol or narcotics.

The succeeding chapters deal with affections of the various structures of the heart, while the concluding one on Clinical Electrocardiography fully describes the application of the electrocardiograph to the elucidation of points in diagnosis hitherto obscure.

The illustrations in the text are both apposite and good, but reference to them would be easier if the page as well as the number had been given.

The Panel Doctor, his Duties and Perplexities. By T. M. TIBBETTS, M.D., M.R.C.S., L.R.C.P., D.P.H. pp. 61. London: John Bale, Sons, and Danielsson. 2s. 6d. net.

THIS is a useful little book—a very useful little book—to those to whom it specially applies. It is, as its title indicates, restricted in its application to those members of the Profession who have become "panel doctors," and to such the work should be of the greatest possible assistance. It deals in an easy, confident fashion with the pitfalls likely to bother the careless, and it is full of the advice which is obtainable only by experience.

Preparations, Inventions, etc.

" VITAFACT."

(London : Messrs. Oppenheimer, Son, & Co., Ltd.,
179, Queen Victoria Street, E.C.4.)

The vitamines, issued under this trade name, have been obtained from cultivations of a pure growth of special yeast, following the indications set forth by Professor Shirlaw.   The object kept strictly in view in the preparation has been to develop a source of supply of vitamines which can be used in association with ordinary foods, and thus to supply the deficiency that is generally recognized to exist.

The preparation is issued in pulverettes, each of which contains an amount of extract equal to the average quantity found to be necessary for sustaining nutrition in a person of light weight taking the ordinary foods.

Their use is indicated in the treatment of all diseases due to a deficiency of vitamines in the food, such as rickets, scurvy, various skin diseases, boils, beri beri, and in all wasting diseases in which it is necessary that all foods taken shall be made as nutritious as possible, so as to check the waste of tissue that has been induced.

" Vitafact salt " provides a convenient method for taking vitamines at ordinary meals in place of the usual table salt.   It is a fawn-coloured powder, of agreeable fragrance, and contains Cerebos salt with Vitafact.

OSCOL CUPRUM.

(London : Messrs. Oppenheimer, Son, & Co., Ltd.,
179, Queen Victoria Street, E.C.4.)

This preparation is a colloidal solution of copper, in which the particles of metal are in an extremely fine condition of subdivision.   They possess the fullest activity, and exhibit, under the ultra - microscope, Brownian movements to a much higher degree than any other colloidal solution.   It is chemically prepared, and is perfectly stable.   It is not precipitated by sodium chloride, and, consequently, possesses a very great advantage over solutions prepared by electrical methods.   The preparation is standardized, and is guaranteed to be perfectly uniform in chemical composition, in stability, and in appearance.   Before being issued, each specimen is carefully examined under the ultra-microscope as regards the volume of Brownian movements shown.

Colloidal copper has been recommended for the treatment of inoperative cancer, and has been favourably reported on in this respect.   It has a powerful bactericidal effect, and is non-toxic and unirritating.   It may, therefore, be given by hypodermic injection in a dose of 1 to 2 cc., or by the mouth, in doses of 1 to 2 drachms, or it may be applied locally.   Its action is improved by dilution with normal saline solution.

It is issued in 1 oz. bottles, and in " Aseptules," containing 2 cc.

THE PRACTITIONER.

DECEMBER, 1918.

———— ✦•❖•✦ ————

MEDICAL NOTES.

By Sir THOMAS HORDER, M.D.

Assistant Physician to St. Bartholomew's Hospital, etc.

ON CARDIAC BRUITS—*concluded.*

(31) The most important of the cardiac bruits to elude discovery is probably the diastolic bruit indicative of aortic regurgitation in the early stages of the disease. The reasons for this are two : (i) The bruit is prone to be " soft " and " distant," requiring a trained ear and a quiet room for its detection ; (ii) it may only be heard to the left of the sternum, and sometimes only to the left of the sternum at its lower end. If either or both of these conditions be present, the diagnosis may be entirely missed. It is therefore a good rule never to quit the auscultation of a heart, and certainly never to quit the auscultation of a hypertrophied heart (*vide* § 18), until the observer is sure that the bruit is not present in this situation.

(32) The cases in which the bruit of aortic regurgitation is of maximum intensity at the lower end of the sternum, and to the left of the mesial line, are not uncommon. More uncommon are the cases in which the maximum intensity of the bruit is at the pulmonary base. In a few instances the bruit may be confined to this last-named situation, in which event mere anatomical considerations suggest a diagnosis of pulmonary regurgitation ; but the presence of the arterial signs of aortic incompetence—jerking pulse at the wrist, visible arterial pulsation at various points and capillary pulse, together with signs of hypertrophy of the left ventricle, demonstrate that the defect is in the systemic and not in the pulmonary system. It may be added that if the diastolic bruit is heard only in the pulmonary area, and none of these concomitant features is present, a diagnosis of aortic regurgitation cannot be made. But this reservation also holds good when the bruit is heard in the more common situations.

(33) Bruits which " come and go " from day to day, and in some instances even from hour to hour : (i) The systolic bruit of mitral regurgitation, when that condition is secondary to failure of the left ventricle, as in dilated heart complicating renal disease (*vide* § 30) ; less often when primary mitral regurgitation is complicated by severe heart failure with great dilatation ; and in acute endocarditis. (ii) The presystolic bruit of mitral stenosis, both at the beginning and at the end of the course of this disease—when the disease is in a stage of

evolution, as may be observed in prolonged cases of subacute rheumatism in children; and when "auricular fibrillation" supervenes, with general dilatation. (iii) The bruits associated with acute ulcerating endocarditis (*but see* § 29).

ON MORBUS CORDIS.

(34) Between patients suffering from aortic disease and patients suffering from mitral disease certain broad clinical differences are observable.

(i) *Facies* —In aortic disease patients tend to pallor, because the arterioles are badly filled; in mitral disease patients tend to cyanosis, because the venules are badly emptied.

(ii) *Pain.*—This is common in aortic disease, and may be of all degrees up to true angina. (But when true angina is present, consider the question of associated lesions, such as coronary atheroma, etc.) In mitral disease, pain is quite uncommon.

(iii) *Night starts and bad dreams* are more common in aortic than in mitral disease.

(iv) *Sudden death* is not uncommon in aortic disease; it rarely occurs in mitral disease.

(v) *Heart failure*, when it supervenes, shows three important differences: (a) Dropsy is both less common and less marked in aortic than in mitral disease. (b) Heart failure proceeds more rapidly in aortic than in mitral disease, and once it has arrived compensation is much less likely to be re-established in the former than in the latter condition. This is because the burden of the extra work has been borne by the ventricle throughout in aortic disease, so that by the time dilatation sets in the myocardium is no longer intrinsically sound. On the other hand, in mitral disease, at the time of initial dilatation, the myocardium has potential energy which can be called forth by treatment. Hence it follows that "mitral" patients not uncommonly give a history of one or more bouts of heart failure with dropsy, etc., from which good recovery has been made, but "aortic" patients rarely do. (c) In the response to treatment the difference may be inferred from (b).

(35) The ætiology of pure mitral regurgitation is quite different from that of pure mitral stenosis. Mitral regurgitation is a residual condition resulting from an old acute rheumatic endocarditis; mitral stenosis is a progressive condition due to sclerosing (? rheumatic) endocarditis. Hence it is the rule to get a history of rheumatic fever in cases of mitral regurgitation, and a history of chronic rheumatism, or chorea, or growing-pains, or of no rheumatic affection at all, in mitral stenosis.

(36) Ascites may be the first sign of cardiac dropsy in mitral stenosis, preceding for a considerable time œdema of the legs. (Ignorance of this fact sometimes leads to an erroneous diagnosis of cirrhosis of the liver.) The explanation of this fact is as follows: In mitral stenosis, owing to the inability of the left auricle to discharge its

contents into the left ventricle, and the consequent inability of this latter chamber to assist in overcoming the valvular defect, there is a gradually increasing venous reservoir formed by the left auricle, the pulmonary circulation, the right heart and the venæ cavæ. The hepatic veins, the largest tributaries of the inferior vena cava, become dilated and share in this venous reservoir, leading to great congestion of the liver and to increased pressure in the portal system. (It is to state this same fact in terms of morbid anatomy to say that the most pronounced instances of " nutmeg liver " occur in mitral stenosis.) This state of things may become definitely established before as yet there is any appreciable failure on the part of the heart muscle. Hence local dropsy of the peritoneum may precede general œdema. Conversely, in mitral regurgitation, although a similar venous reservoir forms, it does not proceed to anything like the same extent, because the left ventricle comes into play from the first in the compensating mechanism. Hence it is that in this latter disease, dropsy, when it appears, appears as the result of heart failure; and inasmuch as the whole venous system is equally affected, it appears first in the legs, since gravity determines the disposition of the œdema.

(37) The same considerations explain the relatively greater frequency of hæmoptysis in mitral stenosis than in mitral regurgitation, whether the hæmorrhage results from a general pulmonary engorgement or from hæmorrhagic infarction. The pulmonary veins participate in the reservoir formation quite early; it is not, therefore, surprising that hæmoptysis should occur at a period in the course of mitral stenosis when other complications are absent. In short, hæmoptysis in mitral stenosis by no means indicates the arrival of dilatation of the heart; in mitral regurgitation, however, it generally does.

(38) Another important clinical difference between mitral stenosis and mitral regurgitation is the greater tendency to embolism in the former disease. The emboli consist of fragments of clot which forms in the dilated left auricular appendix, not of " vegetations from the mitral valve." The valve cusps in mitral stenosis are thick, smooth, and fibrotic, and are quite free from vegetations; moreover, the thrombosed auricular appendix can be demonstrated post-mortem, and not infrequently the embolus can be seen to correspond to the free surface of the clot in texture, colour, and microscopic appearances.

(39) Certain general features characterize patients who are the subject of congenital morbus cordis (as against acquired morbus cordis)—marked cyanosis, clubbing of fingers and toes, polycythæmia, immaturity, and attacks of pulmonary and cerebral congestion. But it should be observed that if morbus cordis is acquired *very early in life*, the patient approximates to the congenital type in some or all of these features.

(40) Every branch of natural science pauses in its progress after

a time, awaiting the introduction of a new method or a new instrument which shall open a fresh field for investigation. By means of the polygraph and the electro-cardiograph, a brilliant chapter has been added of late years to our knowledge of the cardiac arrhythmias, and in the attempt to segregate these there have been advanced several valuable hypotheses which serve as bases for further work.* But let us not decry the instrument that ushered in the last advance, nor forget that the workman will probably prove to be just as fallibly over-confident of the tool he now handles. Yesterday's observer with a familiar instrument to help him; to-day's observer with a new instrument to learn; his mistakes may be different, but they will not be less.

" With that injudicious enthusiasm which has at all times heralded a new method of observation, fabulous qualities were at first attributed to the stethoscope." True, but for " stethoscope " read " electro-cardiograph," and in a hundred years the same sentence will be written again.

(41) " Failure of compensation "—a term that has fallen into disrepute, not to say disrespect. But why? " Heart failure," proposed as a substitute, means nothing else, for the definition offered— " that condition in which the heart is unable to maintain an efficient circulation during the efforts necessary for the daily life of the individual "—is the definition that clear-minded teachers give of " failure of compensation." And in minds that are not clear " heart failure " is quite as liable to become " attendant verbiage " as is " failure of compensation " or any other nomenclature. But in this matter the critic is not quite fair to traditional teaching. He speaks as though " compensation " and " decompensation " were terms applied to all forms of heart disease, whereas they were only applied to cases of primary valvular disease. In primary myocardial disease, in angina, in toxic heart states, and in dilatation consequent upon extrinsic factors, these terms were not used.† In these last-named conditions, " heart failure " is certainly as apt a generic term as can be desired with which to express the signs and symptoms of cardiac inefficiency.

(42) " No one ever dies of mitral regurgitation." Nor of tabes dorsalis, nor of cirrhosis of the liver, nor of pulmonary phthisis—chronic diseases all, but subject to developments that are prone eventually

* A chapter in which British medicine, as represented by Mackenzie, Lewis, and others, takes a foremost place.

† The writer holds no brief for the " physicians " who " give a good prognosis in cases of extreme exhaustion (*sic*) because . . . compensation was good, and there was no objective sign of heart failure." Nor for that " professor of medicine who rejoiced the heart of a man with aortic disease, who could not walk a hundred yards without being pulled up by pain, by telling him that his outlook was good, as there was no dropsy, and, therefore, compensation was good " (*vide* § 34 (v)).

to be lethal.

(43) " When I have looked at the enormous mass of muscle which forms the ventricular wall in these cases " (of heart failure in aortic regurgitation), " I have often wondered whether those muscle-fibres represent a genuine hypertrophy, or whether some disease condition has taken part in the increase." It has; the microscope reveals, in greater or less degree, degeneration of the muscle-fibre, interstitial myocarditis, and sclerosis of the arteries.

(44) Aortic disease evolving in youth or adolescence is the result of acute endocarditis complicating rheumatic fever or scarlet fever; arising between twenty-five and forty it is generally due to syphilitic aortitis; coming on after the age of forty it generally signifies atheroma of the base of the aorta and of the aortic cusps.

(45) If the symptoms in a case of aortic regurgitation advance somewhat rapidly, without obvious attacks of rheumatism, and especially if they include anginoid attacks, the cause is probably syphilis, producing gummatous infiltration of the wall of the aorta. The recognition of the cause is of the greatest importance, because thorough treatment usually leads to good results.

(46) Embolism in morbus cordis occurs as a complication of two conditions, mitral stenosis and ulcerating endocarditis. It is uncommon in any other form of heart disease. The source of the embolus is different in the two diseases : in mitral stenosis, the source is the clot which forms in the left auricular appendix (*vide* § 38) ; in ulcerating endocarditis, the source is the vegetations which form upon the infected valves, or, less often, upon the mural endocardium. But the organs chiefly affected by the embolic process are the same in both cases—the spleen, kidneys, brain, and extremities. And even the results of the process are not so dissimilar as is often thought, because the infarcts produced in the case of ulcerating endocarditis, though infective, rarely suppurate, the reason for this being that the pathogenicity of the streptococci, which are by far the most common micro-organisms in the disease is very slight.

(47) Embolism may occur at a stage in the course of mitral stenosis when as yet there is very little deviation from the normal cardiac response to physical effort, and it may occur long before the onset of " auricular fibrillation." This fact should be remembered in considering the question of prognosis in this disease.

(48) When embolism in morbus cordis is cerebral in distribution, the most common result is right hemiplegia with aphasia; *right* hemiplegia because the embolus enters the left common carotid artery more often than the innominate artery, the former vessel arising from the top of the aortic arch; *hemiplegia* because the embolus comes to rest in the middle cerebral artery, the direct continuation of the internal carotid; *with aphasia* because the lesion is virtually a cortical one, the obstruction to the middle cerebral

producing ischæmia of Broca's convolution followed by softening.

(49) Shortness of breath on moderate exertion is due either to (marked) anæmia, emphysema, myocardial inadequacy or mediastinal disease. The first and second of these causes are not difficult to determine. When they are absent, it is probable that the breathlessness is due to changes in the heart muscle. But if careful examination and inquiry reveal no other evidence of myocardial disease, care must be taken to exclude a mediastinal lesion by radiographic investigation before it is decided that the heart is responsible for the symptom.   .

(50) " The patient had a ' heart attack '." When presented with this fact in a medical history, it is of great importance to get the patient's analysis of his symptoms at the immediate onset, during, and immediately after, the attack. He should be encouraged to make the account as full as he pleases. If the patient expands her sensations over-much, and enlarges the zone of reference beyond the known limits of a cardiac response, this fact itself is of value in assessing the nature and the significance of the event. The investigation should entail as few leading questions as possible; but after the patient's own account has been given some questions of a leading character will probably be necessary; the interrogator must be prepared to attach less weight to the answers given to these latter questions than he has done to the information spontaneously afforded. An effort should be made to collate the patient's experience in terms of *breathlessness, pain, loss of consciousness, exhaustion, palpitation, sweating, flushing.* But due regard must also be paid to other sensations, of nervous, vaso-motor and visceral origin, included by the patient in his general account. In assessing values to these sensations, the intelligence of the patient should go for much, the imagination of the patient for very little.

The analysis of the " attack," conducted in this manner, will in most cases take the observer pretty far towards a decision as to its nature, whether *paroxysmal dyspnœa* (" cardiac asthma "), *syncope* (" a faint "), *angina, heart-block*, or simple *palpitation.* Two other types of heart attacks, *paroxysmal tachycardia* and " *auricular flutter*," require actual observations at the time of their occurrence to determine their nature correctly. Needless to say, any one of the five types first mentioned may be impossible of differentiation without objective data gleaned by the observer at the time of the attack. These objective data include the *facies* (distress, pallor, cyanosis, sweating, flushing), the *posture* (orthopnœa, restlessness, immobility), the state of the *arterial* and *venous pulse*, and, in the case of " auricular flutter," a *polygraphic tracing.*

(51) " .   .   . there is no sufficient evidence that a healthy heart is ever damaged by muscular exertion, however severe or prolonged that exertion may be.   .   .   . Is it to be supposed that the organ (*i.e.* the normal heart) is so ill-protected that it is to be damaged by

actions natural to man ? " (Lewis). But surely it is in the qualification expressed by the word " natural " that the explanation of cases of (to many quite critical observers) undoubted heart-strain lies. Can the excessive effort of the rowing-man and the track-racer, for example, be termed " natural " ? And if it is not natural, then is it not unnecessary to explain the damaged hearts in these cases, which all physicians of experience occasionally meet with, as " examples of heart poisoning from foci of infection or of undetected structural heart disease ? "

(52) In treating a case of heart failure, the heart should not be conceived of as a whole, but rather as a series of chambers, in one of which the main trouble lies. Is it the left ventricle that is in difficulty ? Or the left auricle ? Or is it the right side of the heart ? If the burden falls primarily or chiefly upon one of these, rather than upon the others, and this fact is clearly recognized, the indications for treatment are more definitely established and therefore response to treatment is more likely to be effectual.

(53) Angina pectoris is by no means always associated with high arterial pressure and diffuse arterio-sclerosis. What may not inappropriately be called the " asthenic " type of the disease is not at all uncommon. In this type the blood pressure is often sub-normal, the circulation is poor, peripheral venous stasis is common, and a condition of asystole is present. The patients are usually over sixty years of age. Post-mortem, the heart is not enlarged ; it may even be small and under-weight, with the appearance termed " brown atophy." Atheroma is usually present in one or more of the coronary arteries.

(54) Anginal pain is often induced by cold, and especially by walking against a cold wind. A patient suffering from aortitis will be able sometimes to walk briskly upstairs without discomfort, and yet will be unable to walk quite slowly on the level, if faced by bleak air, without considerable pain.

————————>•◆•◆◄————————

SOME OBSERVATIONS ON THE SANATORIUM TREATMENT
OF PULMONARY TUBERCULOSIS.

By GODFREY BROOKES DIXON, M.R.C.S., L.R.C.P., L.S.A.

Chief Tuberculosis Officer, Birmingham, and Medical Superintendent,
City Sanatorium, Yardley Road.

THE discussions which have recently taken place in the different medical societies upon the value of sanatorium treatment, and the observations upon these in the medical journals, have shown a definite diversity of opinion.

The results of the discussion at the Medical Society of London were summarized by Sir StClair Thomson,[1] who related that Sir Douglas Powell thought sanatorium treatment was, without doubt, the best, not only in the interests of the community, but, in properly chosen cases, of the individual patient as well.   Latham considered sanatorium treatment the best we had, and Camac Wilkinson is recorded as saying that it was invaluable and indispensable in the treatment of certain forms of tuberculosis.

Some of the journals, however, expressed adverse opinions without hesitation, and stated that sanatorium treatment from the public point of view had proved a failure, although, it was admitted, it had rendered very material service to individuals.   Furthermore, for the diminution of the case-incidence and the lowering of the death-rate, other means were said to be necessary, since sanatoria could no longer be regarded as efficient for these purposes.[2]

Before discussing the value of any form of treatment for pulmonary tuberculosis, it is necessary to have a clear idea of its pathological phases and its clinical course.   It is equally requisite to define with some precision what is understood by the term sanatorium treatment, and it would seem to be advisable to enumerate definitely the results which may reasonably be anticipated from this treatment, and upon which its success or failure may be assessed.

Having reviewed these, we are in a position to examine the results which have been obtained, and to attempt an impartial criticism of the situation.

PATHOLOGICAL ASPECTS.

The pathological conditions found in pulmonary tuberculosis are notoriously diverse, and exhibit a variety of changes.   In some instances we find morbid conditions indicative of acute disease, whilst, on the other hand, the changes found in the lung are those of extreme chronicity.   In the same lung, or even in one lobe of the lung, we offtimes find acute inflammatory changes, proof of acute disease, side

by side with the most chronic disease, as evidenced by an extensive formation of fibrous tissue, etc.

Sims Woodhead has described the initial pathological changes as represented by an apical catarrh, which is shown by congestion of the blood-vessels and mucous membranes, accompanied by a proliferation of the epithelial cells lining the air-cells, with an increased pouring out of fluid and the emigration of large numbers of white cells. If the individual attacked is capable of resistance, and the tissues are well nourished, fibrous tissue results, the bacilli become inactive, and the degenerative tissue is partly absorbed and partly changed into scar-tissue. Should the process not become arrested at this point, consolidation probably results, and the tubercles which were originally discrete, coalesce and spread. One of the chief characteristics of chronic ulcerative (pulmonary) tuberculosis is undoubtedly cavity formation. The longer the tuberculosis has been in existence, the greater the liability to cavity formation, except, perhaps, in those cases in which free and extensive fibrosis results.[3]

Fibrosis is evidence of reaction and defence on the part of the organism attacked, and is an attempt to surround and cut off the tubercles and arrest the process.[4] Unfortunately, however, this defensive process, if sufficiently extensive, proves a serious change for the person affected, and may be one of the chief factors in causing disablement, and from fibrosis itself secondary morbid changes may arise, at least one of which, bronchiectasis, occasionally produces serious complications.

Reference to these points in the pathology of pulmonary tuberculosis serves to emphasize the improbability of total obliteration of the disease, once the lung has been attacked. It further illustrates how difficult, or even unlikely in many cases, is the complete shutting off, or encircling of the lesion, if the disease has progressed beyond its earliest phase.

It shows, moreover, how easily dissemination occurs, and should remind us how narrow is the dividing line between active and quiescent disease in any given case, a fact which can too readily be corroborated by the perusal of any carefully recorded clinical histories relating to pulmonary tuberculosis. We are unable to prove that an attack of tuberculosis confers immunity from succeeding attacks; in fact, the individual who has once suffered, unless he has benefited from prolonged treatment or otherwise raised his resistance, and can protect himself from obvious and probable sources of infection, will probably again become infected more readily than one who has never been apparently, or clinically, infected with tuberculosis.

CLINICAL CONSIDERATIONS.

The protean nature of tuberculosis, with its varying phases of activity and quiescence, relapses and recrudescences, is a characteristic upon which emphatic and reiterated stress is laid by writers in every country, and is one with which all who are working amongst the tuberculous must be familiar; it may run an acute course, the duration of which is measured in weeks, or it may pursue a latent course lasting

for years.

The mortality amongst the acute cases is exceedingly high, in the chronic cases it is naturally less, and in some instances of the latter, intercurrent diseases may be the direct cause of death, so prolonged is the course of the tuberculosis.

In chronic cases the course is rarely continuous, but is almost invariably characterized by periods of activity succeeded by stretches of quiescence, or even of arrest, which not unusually last for a decade or longer.

In the great majority of cases, symptoms which are said to mark the beginning of the disease have most probably been preceded for a long time by some which have been ignored, misinterpreted, or possibly attributed to some other disease, so complex and incompletely understood is the symptomatology of pulmonary tuberculosis.[5]

The onset of this disease may present symptoms referable to the respiratory, circulatory, digestive, or nervous systems, and in some of the latter instances has so little apparent connection with the lungs that the most astute are led astray. This complexity of symptoms is well illustrated by the following clinical history :—

CASE M. F., a female, aged 21 years. Complained of headache, loss of weight, weakness and frequent gastric disturbances, as evidenced by discomfort in the epigastrium and vomiting, accompanied by some pyrexia.

Examination of the lungs showed a slight impairment of resonance in the first two spaces on the right side, with interrupted breath sounds. The gastric attacks persisted for nine months, without any alteration in the pulmonary condition. At the end of this period the patient developed well-marked erythema nodosum. She was advised to discontinue work and live in the country for a year, which she did, gaining 13 lbs. in weight. After having resumed work for one year, tuberculous peritonitis developed, for which a laparotomy was performed. Nine months after this cough and sputum appeared, tubercle bacilli were demonstrated, and coarse râles and other evidences of infiltration were found in the upper third of the right lung.

Not only the symptomatology but the pathology of the disease is improperly appreciated, or not borne in mind by some writers, which is shown by their designation of a type of pulmonary tuberculosis under the heading of " abortive." Before admitting the probability of these cases, it is essential to produce conclusive evidence that the disease has been in existence, and if physical signs, symptoms, and sputum findings are in any way dubious, the most definite post-mortem corroboration should eventually be forthcoming. Furthermore, unless the fullest opportunities are given the clinician for constant observation and repeated, careful physical and laboratory examinations throughout the patient's whole life, it would be almost impossible to exclude low activity or feeble recrudescence in those having but a slight lesion combined with a high resistance, in whom the disease was running a benignant course.

The term " abortive phthisis " is a bad one, which is calculated to create a wrong impression, suggesting, as it does, that an invasion by the tubercle bacillus has proved unsuccessful. A tuberculous

infection is never unsuccessful in the sense that it produces no damage; damage always occurs in a variable extent, the variability being tremendous, and until the fullest obsolescence occurs potential mischief still remains, and this condition is not rapidly produced.

THE SANATORIUM, ITS TREATMENT AND POSSIBLE RESULTS.

Sanatoria for the treatment of tuberculosis are institutions especially designed, equipped and staffed like all other hospitals for the treatment, and not directly for the prevention or reduction of the case-incidence of what, in some of its phases, is one of the most chronic diseases known.

The office of the sanatorium has never been to diminish the case-incidence of tuberculosis. It is a hospital or institution where patients should undertake the initial stages of treatment, where acute phases of the disease may be overcome, and, if necessary, particular forms of treatment, such as the induction of artificial pneumothorax, other operative measures, heliotherapy, and tuberculin and vaccine therapy, etc., can advantageously be begun. The necessity or advisability of sanatoria in this respect is emphasized by Morriston Davies, who advises the carrying out of all operative treatment in connection with pulmonary tuberculosis in sanatoria, as opposed to hospitals and nursing homes. He relates that considerable experience of both enables him to assert without hesitation the desirability of the former, and he states that results obtained in hospitals and nursing homes may be extremely gratifying but are often hampered by inability to give the patient those advantages only to be obtained in a fully equipped sanatorium.[6]

In addition, the requisite knowledge concerning dietary, ventilation, infection, collection and destruction of sputum, occupation and marriage —all matters of importance in connection with treatment—can be taught and assimilated better in a sanatorium than elsewhere.

The sanatorium should be the " jumping off " ground in the fight against tuberculosis, the treatment of which, if success is looked for, must be spread over a long number of years, and far exceeds any period which can possibly be spent in a sanatorium.

Constant adherence to a life modelled upon definite hygienic principles becomes necessary for all time, residence abroad or in a fresh locality may be imperative, other means of earning a livelihood may have to be sought, celibacy must oft-times be enforced; in short, the entire aspect of a patient's life may have to be re-cast if he is to live.

This, in an abbreviated manner, indicates the scope of the sanatorium, and outlines the duration and ramifications of some of the outstanding features embodied in the term " sanatorium treatment."

DETERMINATION OF THE SUCCESS OR FAILURE OF TREATMENT.

Since diminution of the case-incidence and death-rates of a disease are obviously unfair and unacceptable measures of the success or otherwise of institutions created for treatment, it may be asked on what points is the success or failure of sanatoria or sanatorium treatment

to be gauged ?

Without being too precise, it may be measured by the percentage of bacillary losses in the sputum, the improvement or deterioration of working capacity after treatment, the diminution, cessation or accentuation of symptoms, the quiescence or activity of the disease after a prolonged period of treatment and, if it can be estimated, the prolongation of life.

The results of sanatorium treatment may be classified as immediate and remote, the former dealing with the conditions found upon the completion of a period of institutional treatment, whilst the latter represent the findings after the lapse of a period of time measured by years.

In the first of the following tables, the figures recorded relate to the condition of the disease as regards its activity or quiescence, and the bacillary losses in the sputum, of 555 patients after a period of combined sanatorium and dispensary treatment. The average period of sanatorium treatment was three months, and of dispensary treatment ten months. At the time of the examinations from which the records were obtained all the patients were living under home conditions, and many were following their occupations :—

——	Nos.	*Quiescent Disease after Treatment.	Number T.B. + before Treatment.	Number losing T.B. after Treatment.
Stad. I.	221	115 or 70·13 p.c.	74	63 or 85·13 p.c.
Stad. II.	248	108 or 43·53 ,,	123	96 or 69·91 ,,
Stad. III.	86	18 or 20·93 ,,	54	27 or 50 ,,
Totals	555	281 or 50·6 ,,	251 or 49 p.c.	176 or 70·11 ,,

* Note.—All cases presented signs of activity prior to treatment.

The figures below relate to patients who were treated in the Birmingham Municipal Anti-tuberculosis Centre during the year 1913; some, however, began their treatment during the year 1912.

The findings are the result of an investigation carried out in the latter quarter of the year 1917 and the first quarter of 1918.

The first table represents a summary of the condition of 1,655 patients.

Patients known to be alive   -   -   -   928 or 56·1 per cent.[7]
Patients known to have left the city   -   185 or 11·17   ,,
Patients known to be dead   -   -   -   161 or 9·7   ,,
Patients who could not be traced   -   -   375 or 22·65   ,,
Patients known to be incapacitated through
    causes other than tuberculosis   -   -   6 or ·65   ,,

In connection with those patients who cannot be traced, some are undoubtedly dead; it would be unfair, however, to assume that all

are dead or have done badly. Experience shows it is not the tuber-
culosis patient that has done badly who " loses contact "; as a rule,
such are constantly re-applying for further treatment, but, on the
contrary, many who attain quiescence are anxious to be lost sight of
and to forget what some of them undoubtedly consider a physical
stigma.

The succeeding table gives a more detailed account of the stage
of the disease at the beginning of treatment, and the capacity for
work at their final examination of some 404 of the above patients, in
whose sputum tubercle bacilli were demonstrated.

At Beginning of Treatment.

Total Number.	Stad. I.	Stad. II.	Stad. III.
404	132	175	95

When last examined.

Working Regularly.	Working Irregularly.	Totally Incapacitated.
182 or 45 per cent.	119 or 29·4 per cent.	43 or 10·6 per cent.

Of these 404 patients, 233 were males, of whom 13 served in the
Army or Navy subsequently to their institutional treatment, 171 were
females.

Of the total number, 31 had left the City; therefore, no reliable
account of their working capacity can be given.

The figures given in the first table represent " immediate " results;
those in the second and third " remote " results.

CONCLUSIONS.

(1) Looked at broadly from the clinical standpoint, cases of pul-
monary tuberculosis may be divided into two large classes : those in
which the disease runs an uninterrupted course, and those in which
it pursues a chronic and interrupted course. The acute case which
progresses has usually a fatal termination ; it responds but ill to treat-
ment, and terminates comparatively quickly. On the other hand, the
course of the chronic case is marked by more or less prolonged periods
of activity and quiescence. In the latter type of case, if the lesion
is not too extensive, and the resistance is high, other influential factors
being equal, the patient may make a good recovery, and need not
show much deterioration as a result of the infection. If, however,
relapses and recrudescences are frequent, the disease usually progresses
to a fatal termination, and should this be postponed, the attempts at
defence and repair on the part of the infected organism and their

sequelæ will cause disablement, more or less complete.

(2) Many cases of undoubted tuberculosis become arrested and assume a state of quiescence without the individual having to discontinue employment or undertake any treatment. Post-mortem findings show this to be not infrequent in the case of circumscribed apical lesions and inextensive fibrinous pleurisies.

(3) Moderate and even unimpaired capacity for work, extending over a long period, is compatible, and does exist with extensive pulmonary tuberculosis. This is well shown in many cases of so-called chronic bronchitis in whose sputum tubercle bacilli have been demonstrated.

(4) Sanatoria, like other hospitals for the treatment of a special disease, cannot reasonably have their work stigmatized because the national death-rate and case-incidence of the disease they treat do not fall. They were called into existence for the treatment and diagnosis of tuberculosis, and not for its prevention.

(5) The prevention of tuberculosis is inextricably bound up with the question of proper housing, and tuberculosis may well be regarded as a house disease: if there is to be a reduction of the case-incidence, housing reform must be seriously undertaken. This alone, however, will not suffice; the occupants of the house must understand and practise proper ventilation and cleanliness; in addition, they must be taught that insufficient food and clothing, and intemperances of every description, predispose to tuberculosis.

(6) The provision of sufficient hospital accommodation for advanced infective cases, which cannot be satisfactorily isolated at home, is an essential prophylactic item.

(7) Prevention and treatment as regards tuberculosis are certainly not synonyms; the failure to grasp this axiom has produced unmerited dissatisfaction with the sanatorium and its treatment. Had its prevention been pursued with the same zeal and vigour as its treatment, there would have been to-day no necessity either for disappointment or reproach.

REFERENCES.

[1] THE PRACTITIONER, February 1918.

[2] *Brit. Med. Journ.*, December 8, 1917.

[3], [4], [5] Norris and Landis: *Diseases of the Chest, and the Principles of Physical Diagnosis.*

[6] *Quarterly Journ. of Med.*, April 1918.

[7] Birmingham Public Health Department, Annual Report 1917, Tuberculosis Section.

NOTES ON THE TREATMENT OF SEPSIS BY ZINC IONIZATION.

By A. R. FRIEL M.D., F.R.C.S.I., *Captain, S.A.M.C.*

THE treatment of sepsis by zinc ionization consists in the introduction of zinc into the septic area by means of the electric current. Zinc ions are present in an aqueous solution of zinc sulphate, and when this is placed in contact with the tissues and connected with the positive pole of an electric battery, while the negative pole is on a distant part of the patient's body, the zinc ions enter the tissues.

The solution of zinc sulphate ordinarily used contains:

Zinc sulphate	-	-	-	-	0·25 grams.
Alcohol	-	-	-	-	0·75 cc.
Water	-	-	-	-	to 100 cc.

But when it is desired to have the solution viscid, so that, for example, it may adhere to a sloping surface, gelatine is an ingredient:

Zinc sulphate	-	-	-	-	2 grams.
Gelatine	-	-	-	-	15 grams.
Water	-	-	-	-	to 100 cc.

Two experiments carried out in the laboratory give some explanation of how ionization with zinc acts in sepsis. The first is one by Professor
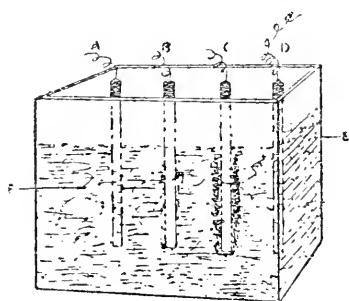
FIG. 1.—A. *Iron.*
 B *Copper.*
 C. *Zinc.*
 D. *Negative.*
 E. *Glass Box.*
 F. *Serum.*

Leduc. A glass trough is filled with serum, and into it three wires— one of copper, one of iron, and one of zinc—are dipped, while a rod of any metal is connected with the negative pole of a battery. Each of the other wires is connected in turn to the positive pole, and the current allowed to flow for a time. It will then be seen that no clot is formed round the iron wire, a soft, scanty one round the copper, but a firm, large one round the zinc, and so firmly does it adhere to the wire that, when it is lifted out of the serum, the clot comes with it. Thus the zinc ion is a great coagulant of albumen.

The second experiment shows the antiseptic power of zinc.

A U-tube contains in its bend some firm sterile gelatine, containing 0·9 per cent. salt, so as to make it approximate to the osmotic pressure

of the blood. A syringe-full of blood is drawn from a vein, and squirted on to a young culture of staphylococcus on a sloped agar tube. The cocci and the blood are thoroughly mixed, and then an equal quantity of the mixture, say, 1 cc., is added to each limb of the U-tube and allowed to clot. As soon as this takes place, sterile gelatine containing enough zinc sulphate to be isotonic with the blood, is added to one limb, and to the other, sterile salt gelatine. As soon as the gelatine has set, the U-tube is inverted and placed so that one limb rests in a large test-tube containing sterile zinc gelatine, and the other limb in sterile salt gelatine. The tubes are connected, as shown in the diagram, with other tubes, containing respectively sterile zinc gelatine and sterile salt gelatine, so that the acid and alkali which are always formed at the positive and negative poles may be sufficiently far away from the blood not to reach it. The zinc gelatine is placed in contact with

FIG. 2.—A. *Electric Wire.*
  B. *Gelatine and Salt.*
  C. *Blood and Microbes.*
  D. *Gelatine and Zinc.*
  E. *Wood Stand for Test Tubes.*
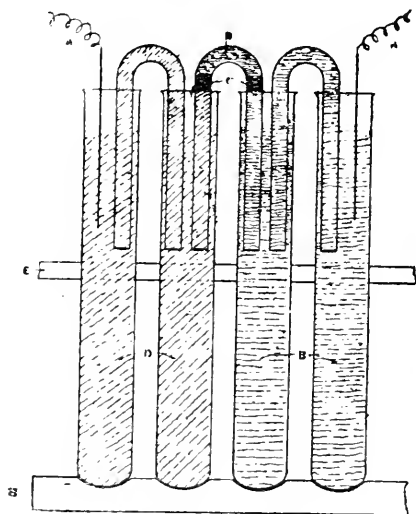
the positive pole, and the salt gelatine with the negative pole of a source of electric current. A current of 7 ma., for a tube one-third inch in diameter, is allowed to flow for many hours till the zinc has penetrated the blood clot with which it is in contact, and travelled for some distance into the salt gelatine on the other side of the same blood, but not so far as to reach the blood clot in the opposite limb. The tube is then removed from the stand, and is cut across just above the blood clot on each side, and portions of each clot are emulsified in salt solution and plated, and some of the clot is also rubbed direct on agar plates. The platings from the blood clot into which the zinc ions have entered prove sterile on incubation, while the other blood clot gives a good growth.

Turning to the clinical side, I have found that ionization with zinc is successful in—

(*a*) Middle-ear suppuration, empyema of the maxillary, of the

frontal, and of the sphenoidal sinuses.

(*b*) Impetigo of the face, eczema, ulcers of the arms or legs.

(*c*) Some wounds.

The criterion to judge the beneficial effect in all the above classes is the rapid and striking improvement that occurs. In many cases, the result may be described as the immediate and complete cessation of suppuration. The following table shows that zinc ionization is an efficient method of treatment for some cases of otorrhœa :—

Patient.	Duration of Disease.	Anatomical condition.	Treatment.	Result.
K	3 weeks	Central perforation - -	5 ma. 10 mins.	Quite well next day.
L	1 month	Perforation behind malleus -	1½ ma,	Do. do.
A	Frequent attacks for some years.	Large central perforation -	1 ma. 6 mins.	Do. do.
E	3 days	Perforation front of malleus	3 ma.	Quite well when seen two days afterwards.
B	—	Perforation below malleus -	3 ma. 10 mins.	Quite well next day.
H	7 days	Perforation behind upper part of handle.	1 ma. 10 mins.	Do. do.
S	3 days	———	2 ma. 6 mins.	Do. do.
W	3 months	Large perforation behind malleus.	2 ma. 6 mins.	Quite well when seen two days afterwards.
R	8 weeks	Perforation behind malleus -	3 ma. 8 mins.	No discharge whatever two days afterwards.
E	14 days	Central perforation - -	1½ ma. 15 mins.	Do. do.

No other treatment whatever, except zinc ionization, was employed in these cases. By "quite well" is meant that all discharge had ceased, that the mucous membrane was pale, that there was no sign of inflammation, and that no recurrence of the disease took place so far as is known. This does not imply that there will be no recurrence if, for example, the patient bathes and allows water to run into the middle ear, or if he gets a severe cold and infection spreads from the throat.

To ionize the ear, all discharge is first washed away by syringing with the aqueous solution of zinc sulphate, and the patient then lies down with the affected ear uppermost. The ear portion of a Siegel's speculum made of vulcanite is inserted, and the ionizing fluid poured into it. The outer portion is now attached, and suction applied to remove any bubbles of air which might possibly be entangled in the deeper parts of the ear, and which would prevent contact of the fluid with the whole area of the cavity to be ionized. The outer portion is then removed, and the special terminal attached in its place. A wick of cotton wool is insinuated through the speculum into the deeper part of the meatus to avoid any chance of a break of contact if, by some movement on the part of the patient, the fluid should be spilt. The current is increased gradually until it reaches 3 ma., and is allowed to act for about six minutes and then gradually decreased.

In the above class of case, the explanation of the otorrhœa usually

seems to be that, following an acute attack, there is present in the middle ear a well of discharge which, being infected, irritates the mucous membrane and causes more discharge. In ionizing with zinc, the well is cleaned out and disinfected, and a slight astringent effect is produced on the mucous membrane. The discharge therefore ceases. As this statement about the effect of zinc ionization in otorrhœa can easily be verified by others, the following classification of cases of
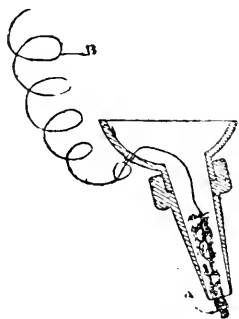
Fig. 3.—A *Cotton Wool.*
B. *Electric Wire.*

chronic otorrhœa is given as a guide to discriminate between suitable and unsuitable cases :—

A. Those in which the whole area of suppuration can be reached by zinc sulphate, and where there is no reason to believe that layers of tissue, carious portions of bone, etc., cover a nidus of bacteria.

B. Those in which the whole area cannot be reached owing to either :—i. The perforation being so small that fluid cannot be made to pass from the meatus into the middle ear; or ii. The impossibility of getting fluid into septic cavities discharging into the middle ear; or iii. Growths, such as polypi and granulations; areas of caries sheltering a nidus of bacteria.

This classification does not take into account diseases such as tuberculosis, in which the trouble is deeply situated in the tissues. It shows those cases in which complete cure of the suppuration within 24 hours can be expected, and those in which some other form of treatment in addition to, or apart from, ionization is needed. The classification may seem to limit the cases suitable for ionization, but it gives a clear idea of the obstacles that have to be overcome before recovery can take place. Ionization with zinc is sometimes a great aid in diagnosing the condition of the ear and discovering the cause of discharge persisting. If there is a failure in what seems to be a suitable case, the cause may be quite evident after ionization. The greater part of the ear may now appear healthy, but at one part signs of inflammation, a small granulation or evidence of disease of the attic may be disclosed. I am inclined to believe that, in the great majority of instances, if a case can be classed as A, it will be well within 24 hours, and that if it is not so, subsequent examination will unmistakably show that it should not have been classed as A.

Impetigo, using the term to mean crusts covering shallow

ulceration on the face, can be satisfactorily treated by zinc ionization. The technique consists in removing all crusts and washing the affected area thoroughly with sapo mollis (B.P.) and ether, and then rubbing into the ulcers and adjacent skin melted zinc gelatine. A layer or two of gauze soaked in this is then laid on the affected area, a little more gelatine applied, and a few more layers of gauze. Outside this is placed a pad of wool soaked in aqueous zinc sulphate solution, then a folded towel soaked in the same solution, and finally the metal electrode. After ionization for a quarter to half-an-hour, with from 10 to 40 ma., depending on the extent of skin affected, all the coverings, except the gauze, are removed. A layer of wool is laid on the gauze, a bandage applied, and all left in place for three or four days. Relief of discomfort, subsidence of inflammation, and healing set in at once. If the dressing becomes disturbed and the area is irritated, a second ionization is not so beneficial. The repeated introduction of an ion into the skin can excite inflammation.

Large bullæ are sometimes seen on the skin, each surrounded by a red halo. In ionizing these with zinc, the skin of the blisters is removed, and zinc gelatine applied. After ionization, a dressing of sterile vaseline in gauze is put on the sore. In these cases the germs (streptococci) may be beyond the limit to which the zinc has penetrated, and it would not be safe to apply an adherent dry dressing.

Eczema of the auricle and external auditory canal can be treated by the same method as impetigo of the face. The auditory canal is often narrowed by the inflammation, and it is necessary to insert a wick of gauze soaked in zinc gelatine. The outer end of the wick is drawn into the vulcanite speculum which is used in ionizing cases of otorrhœa. The pinna is covered with gauze soaked in zinc gelatine. One application of 15 ma. for three-quarters of an hour is given. The gauze is not removed for from five to seven days. For a few days the pinna will require protection by cotton wool from cold and from rubbing. Any small spot devoid of epidermis can be smeared with boracic ointment diluted with an equal quantity of vaseline. A few cases of mild sycosis have been similarly treated by zinc ionization with success. In parts like the face, where there are bony angles, the electrode can be made of flexible wire gauze or metallic tinsel. The patient should lie down, so that gravity may help to keep the application in contact with the skin. A dose of 40 ma. for three-quarters of an hour should be given, and the gauze and gelatine should not be removed for three days.

Boils, abscesses, and carbuncles are suitable for treatment by zinc ionization. A boil is usually connected with a hair follicle, and has a small opening through which thick pus can be expressed. In boils, when this has been done, and in abscesses when the pus has been washed out through a small incision, zinc ionization usually results in immediate and complete cure. In carbuncles, if all the sloughs can be removed, zinc ionization causes the same striking change namely, cessation of pain and tenderness and discharge, and rapid subsidence of the swelling. If sloughs have formed, but not separated, I do not attempt to ionize, but wait until they can be

detached. In treating these cases, care is taken that the ionizing fluid is in contact with the whole area to be treated, and that the wire or metal which conveys the current to the fluid does not touch the tissues. The diagrams (Fig. 4) explain the technique. Our aim is to distend slightly the abscess cavity and keep it full of solution. If the opening is small, this can be done by inserting the point of the conical nozzle of the tube into it. If there is more than one opening, or if this is very large, the chimney of an oil lamp can be pressed against the skin so as to enclose widely the affected area, and the
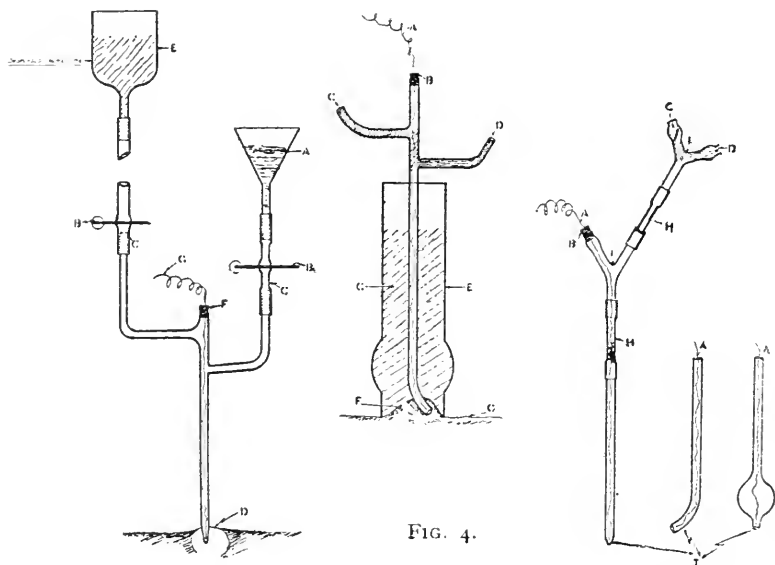
FIG. 4.

A. *Zinc and Gelatine.*	A. *Electric Wire.*	F. *Carbuncle.*
B. *Clip.*	B. *Rubber Cork.*	G. *Skin.*
C. *Rubber Connection.*	C. *Zinc Lotion.*	H. *Rubber Pipe.*
D. *Abscess.*	D. *Zinc Gelatine.*	I. *" Y " Junctions.*
E. *Zinc Sulphate Lotion.*	E. *Ordinary Lamp*	J. *Various Nozzles.*
F. *Rubber Cork.*	*Chimney.*	
G. *Electric Wire.*		

fluid escaping from the cavity into the depths of which the glass nozzle dips, rises in the chimney, and so the whole raw area is bathed in the fluid. It has been usual, after the cavity has been ionized with the ordinary watery solution, to run in some containing gelatine as well as zinc. This is poured into the funnel, and at the same time a pad of double cyanide gauze cut from one side to the middle is placed flat on the skin round the glass tube over the abscess area. Some of the escaping gelatine is retained in the gauze. This soon dries, after a layer of cotton wool and a bandage have been applied. The dressing is not removed for three days. If there is any reason to fear that a slough has not been entirely removed, I use as a dressing gauze soaked in sterile vaseline, instead of the double cyanide gauze and gelatine. In the great majority of instances, when the gelatine and gauze

dressing is removed, the boil or abscess is cured—no discharge, no pain, no tenderness exist. The strength of current employed is, for a boil or small abscess, 7 to 10 ma. for five to ten minutes.

Ulcers and small wounds are good material for studying the effects of ionization on bacterial infection. There is no great difficulty in sterilizing the surface of ulcers, but there is great difficulty in keeping it sterile. If the tissues beneath are acutely inflamed, or if a small sinus in the centre of the ulcer communicates with underlying bone, sterilization of the surface is not to be expected. The adjacent skin is a ready source of re-infection, but this can be guarded against by painting the skin for a wide area round the ulcer with 10 per cent. formalin in a 20 per cent. solution of gelatine in water. In recent surface wounds, where an excision of damaged tissues has been practised some time previously, it is possible to ionize and sterilize the surface, excise the epithelial margin, bring the edges together, and obtain primary union. A small drain of catgut, horsehair, or glove-rubber should be laid on the floor of the wound, and drawn out of one angle to allow the escape of serous fluid, which would, if retained in the wound, cause tension.

When possible, it is a distinct advantage, before ionization, to measure the area to be treated. This may sometimes be done by marking it on a celluloid film laid on the wound, and then tracing the outline on to paper ruled in squares of a definite size, *e.g.*, centimetres and millimetres. By counting the squares the area is known. Proceeding in this way, and making agar cultures of wounds after zinc ionization, it appears that a current of 4 ma. per square centimetre for ten minutes sterilizes. This is what I am using at present, but it is quite likely that with longer experience it will be possible to state definitely for the average case the dose below which sterilization cannot be expected. The minimum is what we want specially to know. There seems to be a considerable latitude in the maximum one can safely give. To make it possible to compare results easily, I propose that a current of 1 ma. for one minute per square centimetre be taken as a unit, and called a Leduc, after the physician and physicist who has done so much work in the treatment of patients by ionization. To express the dose given to a patient it would convey more clearly the information to one's colleagues to say, for example, that " the ulcer had 36 Leducs," than to say that " he had 180 ma. for 12 minutes over an area of 60 square centimetres, or 3 ma. per square centimetre for 12 minutes"

When the skin and ulcer have been washed with ether soap and warm water, the skin is dried and painted with formalin gelatine. The ulcer is sponged with the watery solution of zinc, and then several layers of gauze, cut of such a size as just to overlap the edge of the raw area, and forming a thickness of half an inch, are soaked in sterilized zinc gelatine and laid on the wound. The electrode is held firmly in position by the surgeon against the gauze, or is bandaged on. The current is turned on, the strength depending a good deal on whether the patient is or is not under an anæsthetic. If the patient is under an anæsthetic, a current of 60 to 80 ma. for a small area is used; but when the area is large, 200 to 250 ma. are given.

The length of time during which it is allowed to flow is determined from the formula :—

$$\frac{\text{Time} \times \text{current in ma.}}{\text{Area in square centimetres}} = 40 \text{ Leducs.}$$

As all the factors except the time are known, this can be calculated. When the gauze is removed, the raw area often presents a white appearance. The epithelial margins can now be excised, and the edges brought together by sutures.

Deep wounds may be divided, for ionization purposes, into those in which the wound cavity is of a simple shape, and into those in which the cavity is irregular in shape and presents crevices, pockets, and extensions. Gloves of two different sorts illustrate what I want to convey. There is the glove which Arctic explorers wear, and which consists of a single cavity; and there is the glove we use every day. To ionize the former, we would fill the cavity and take care that the pole which dipped into the fluid did not touch the leather. To ionize the interior of the every-day glove, and to ensure that a square
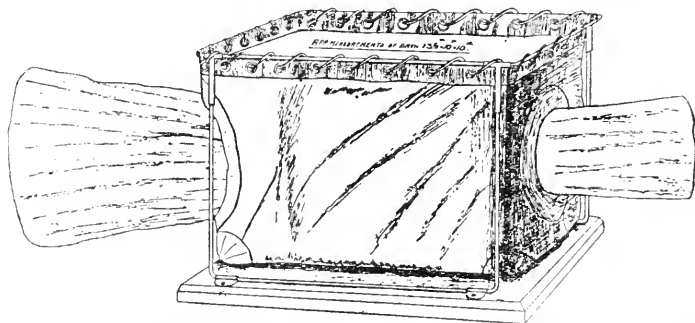
FIG. 5.—*Limb bath made from waterproof sheeting. It is laced to a wire frame. This is supported on uprights which can be disjointed near the top, so that the frame and bath can be drawn more easily over an injured limb.*

centimetre of the surface of each of the fingers received as much current as a square centimetre of the palm, it would be necessary to carry a wire down each finger, and not merely have one wire dipping into the palm. For this reason an accurate knowledge of the form of a wound is necessary, and this can only be gained, in the majority of cases, by examination under an anæsthetic. Special attention has to be paid in ionizing deep wounds to the mechanical cleansing and removal of all debris and clot, to the introduction of the ionizing fluid to the very bottom of the wound, so as to ensure contact of the fluid over the whole area of the wound cavity, and to the uniform distribution of the electric current over the whole surface. The diagrams (Figs. 5, 6, and 7) show some devices we have used. From a small experience in treating these cases I can say that, for wounds of the soft parts only, the good results are in some cases just as immediate and complete as in the simpler cases referred to earlier in these notes. Examination and treatment under an anæsthetic are likely to be more effective than when the patient can feel the manipulations necessary to discover the extent of the wound and to

introduce whatever tubes are required. I have not yet had a large enough experience of wounds with bone involvement to speak definitely about a technique suitable for cases of compound fracture.

Immediate cure was not obtained in every wound, boil, or ulcer that was ionized. This is due especially to two reasons : first, that the form of the septic cavity was not exactly realized, and suitable
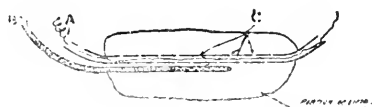
A. *Electric Wire.*
B. *Zinc Solution.*
C. *Perforations.*

Fig. 6.—*In the case of a very long perforating track the solution conveyed to the middle fills the whole wound. The wire conveying the electricity is enclosed in a perforated rubber tube and made to traverse the track.*

measures were not adopted for cleansing it and bringing the ionizing fluid into contact with its whole area ; and, secondly, that sometimes the germs are deep in the tissues and beyond the reach of the agent employed. Ionization with zinc is essentially a treatment of the surface layers of the wound ; it " fixes " the bacteria and superficial layer of the exposed area without irritating the contiguous tissues.
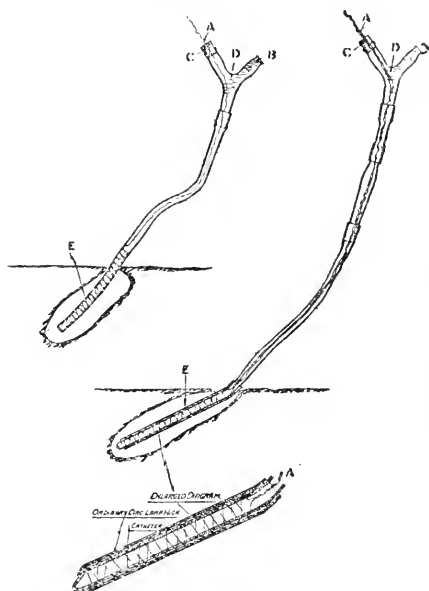
Fig. 7.—A. *Electric Wire.*
B. *Zinc Solution.*
C. *Rubber Cork.*
D. *" Y " Junction.*
E. *Electrode.*

The upper electrode consists of a closely wound spiral inside a perforated rubber tube. In the lower electrode a catheter with a terminal opening is transfixed with a wire, the free ends of which are coiled loosely round the outside of the tube for some inches, then pushed through the wall and made to emerge at the other end. A circular cotton wick is drawn over the exposed wire, and at each extremity is neatly bound with thread.

Thus, by mechanical removal of the fluid in a cavity followed by disinfection of its wall, and by the establishment of a barrier between the cavity and its surroundings, the healthy tissues are protected from irritation, and there is a great diminution in the amount of serum and the number of leucocytes that escape from the tissues and stagnate in the cavity. Then nature, freed from dealing with infection, rapidly repairs the structural damage.

MASSAGE AND ELECTROTHERAPEUTIC WORK AT A WAR HOSPITAL.

BY N. MORRIS, M.B., CH.B., B.Sc., D.P.H., CAPT. R.A.M.C.

So much has been written on the use of massage and electrical treatment in medicine and surgery that some apology is necessary for this paper.   No attempt has been made here, however, to go into any of the details of treatment, which are well known to all those who have read Sir R. Jones's works.   So far as I am aware, at any rate, there has been no attempt to indicate, even in a general way, the results of treatment, and as this branch of therapeutics must of necessity grow in importance, a summary of the work of the massage department at a home hospital may be not uninteresting.

The paper is based upon the results of about 1,200 cases treated in the Lord Derby War Hospital, Warrington, during the past nine months.   Unfortunately in some respects the records are incomplete, which has been more or less unavoidable owing to the exigencies of the service.   Thus many cases only received two or three treatments before being transferred to auxiliary hospitals, where it was no longer possible to keep accurate records.

The majority of the cases treated were surgical, and by far the larger number of these consisted of injuries in which movements of joints were involved to a greater or less extent.   Before dealing with these, the large number of cases not sent for massage may be mentioned.   These had suffered from flesh-wounds which apparently did not interfere with movements, but it is surprising to note that, in not a few of these cases, pains and stiffness have resulted.   This must be due to the very large amount of scarring in the tissues, with the formation of large, bloodless cicatrices pressing on the surrounding muscle-substance.   There is no doubt that, if such cases had had massage treatment fairly early, there would have been much less cicatrization, owing to the greater vascular flow produced with resultant absorption and consequent less formation of fibrous tissue. As to the time at which to begin massage in such cases, this has not been quite settled.   I think that in very few cases arriving in England this treatment cannot be begun almost immediately.   The danger of spreading septic material into the neighbouring tissues must be remembered, but in cases in which sepsis is not very extensive, if the massage is very gently done, I think that this may be neglected, while the tonic influence may go a long way to ensure speedier healing.   The one contra-indication is when the massage causes the patient discomfort.   So far we have not had any cases of recrudescence of sepsis, although such have been recorded.*

Whatever opinion is held on septic cases, there can be no question

* Swan and Goadby : *B.M.J.*, p. 741 (November 20 1916).

that, once the granulations are healthy, massage ought to be started immediately. I grant that, owing to the shortage of trained masseuses, this is more or less ideal, but I suggest that each ward of a general hospital should have attached to the staff a masseuse, who could give massage and faradism. The central massage-ward would then need a much smaller staff, which could deal with those patients requiring other forms of electrical treatment, and detailed examination of nerve-injuries, etc. could be carried out there as required.

As regards the various forms of treatment employed, massage is by far the most useful, besides the most easily administered, because no complicated apparatus is required. Passive movements are very important, and we have found out again and again the truth of Sir Robert Jones's statement that the indication for the duration and extent of the movements is the pain felt by the patient.

Radiant heat has been found very useful in lessening the pain of joint injuries, and as a preliminary to forcible movement under an anæsthetic. It appears, to some extent, to get rid of the induration of the tissues, and so is a very useful adjuvant in all such cases.

Faradism is very important in joint and nerve injuries, especially the latter. I have not been able to detect very much advantage from the use of galvanism compared with that of faradism in the treatment of nerve-injuries. For a few months the galvanic apparatus of the department was out of order, and there was not very much difference in the results obtained from the use of faradism alone, than when galvanism was in use.

Ionic medication or cataphoresis is of some value, but I think this treatment has been rather over-estimated. It certainly does something to alleviate pain, and for this a 2 per cent. solution of potassium iodide is by far the best. It is doubtful, however, whether very much better results are obtained than by the use of stabile faradism or anodal galvanism. Certainly, in cases of chronic rheumatism so-called ionization with this salt seems to have a temporary beneficial effect. Ionic medication appears to be of considerable value in loosening tight cicatrices, and in the freeing of nerves, provided the treatment is begun early enough. As regards treatment of the nerve-injuries, it is very difficult to come to an unbiassed conclusion, but we have had several cases in which, as the nerve appeared to be getting involved in scar-tissue, ionization was given with the result that no nerve symptoms appeared. One class of case in which ionization is of little or no value is that in which there has been involvement of bone with consequent formation of callus.

Each patient ordered massage and electro-therapeutic measures was examined before beginning treatment, and all defects of movement and sensation, subjective and objective, were noted. If there were any signs of nervous involvement, the electrical reactions of the muscles suspected of being implicated were tested. During the period of treatment, notes of the progress of the case were taken weekly as far as possible, and the condition of the patient on discharge was noted.

The following is a summary of the cases treated, with the results

obtained.

Shoulder.—157 cases of restriction of movement of the shoulder-joint were treated. Of these, 16 had the joint involved and the results obtained were poor, 9 remaining fixed, whilst 5 had only slight range of movement, and the remaining 2 had a fair degree of abduction. In two instances, the joint had been excised, but both resulted in ankylosis. 75 were due to injury to bone, and the results were fair; the average range of abduction bordered on 70°. In 57, the restricted movement was due to injury of the soft tissues, and these cases had a fairly good abduction movement averaging about 100°. 7 cases were due to contusion, and in these the improvement was also good, for the resulting movement in each case was about 120°. In two instances, the paresis of the shoulder-joint was functional, and the progress in hospital was poor. In one patient, who developed immobility of the joint after an attack of lobar pneumonia, recovery was almost complete.

Elbow.—267 patients with restricted movements of the elbow-joint were treated. In 37 the joint itself was involved, and, as was to be expected, the results were worse than in any other type. 14 were discharged with ankylosed joints, whilst 20 had an average movement of about 50°. In one case there was almost complete recovery. In three instances the joint was excised, one resulting in an ankylosed joint and the other two remaining flail. Of the latter one was quite a strong and useful joint when fitted with a brace.

In 109 cases, the restriction of movement was due to involvement of bone, resulting in 15 cases in fixed-joints; in 70 of these, an average range of 70° was ultimately obtained, whilst in 22 others there was almost complete mobility; but only two patients were discharged to Duty I.

In 102 instances, the cause was a flesh-wound, more or less extensive. Of these, 6 resulted in completely fixed joints, 5 being the result of great septic infiltration of the tissues, and the other being due to extensive loss of muscle-substance. In 35 cases, an average range of 80° was obtained, whilst in 50 there was almost complete return of movement; in 12, the recovery was complete. In many, full return of mobility had been greatly retarded by the prolonged use of slings and splints. This cannot be deprecated too much, for the tendency of joints to stiffen is very great when kept fixed. If splints are necessary for any length of time, it is essential that massage and some slight passive movements should be given daily, if at all possible. In connection with the elbow-joint, it has been found that the tendency to septic infiltration of the soft tissues round the joint was very great, especially if there was any damage to bone. In one case, some restriction followed on a post-pneumonic arthritis of the non-purulent variety; full mobility was ultimately obtained. One patient showed functional paresis of the joint; there was a small wound in the shoulder region, but neither wasting, sensory defect, nor diminution of response to faradism. No effect was visible on the voluntary movements after two months' treatment, when he was

transferred to another hospital.

Hand.—280 patients were treated for defective movements of wrist and fingers. In only one instance in which the wrist itself was involved was there anything like complete recovery; in all the others the wrist was either ankylosed or with limited movement. In a few instances in which there was involvement of bone or even soft tissues only, the result was very poor, and this can be attributed to extensive sepsis, which here more than in any other locus seems to have a very binding effect on the tissues. Many cases require prolonged treatment, and in some of these, at any rate, this was due to the too long use of splints, especially when these rendered the fingers immobile. 9 patients suffered from causalgia, which was relieved more or less by stabile faradism or ionic medication with potassium iodide. Radiant heat was not found to be of much service, owing probably to the deep matting of the tissues. One case of tuberculous wrist-joint was treated with apparently good result, but, as the patient was soon discharged, it is impossible to say whether he has had any recurrence. A case of non-suppurative arthritis following on lobar pneumonia also gave a very good result. There were two instances of functional loss of power of the hand. The electrical reactions were normal, and there was no wasting, but there was complete anæsthesia in areas which did not correspond, even roughly, to any known nerve supply. These patients made not the slightest progress to recovery.

Hip-joint.—12 cases with weakness of hip-joint were treated; in 4, the joint itself was injured by gunshot wound, and the resultant movement in 2 was nil, whilst in the others it was but slight. In the 3 cases in which the restriction was caused by injury to bone, the results were very good, recovery being almost complete, and this was the case with those due to simple flesh-wounds. In 3 instances the lesion was an arthritis of non-traumatic origin, and practically no progress was recorded after prolonged treatment.

Knee.—237 cases of defective movement of the knee-joint were treated. In 29, the joint itself had been penetrated by a projectile; in 20, there was bony injury, and in the remaining 9 only the soft tissues were damaged. In these cases of injury to the joint with damage to bone, the results as regards movement were not very good, as was to be expected. Only 7 obtained a fair degree of movement, while in 8 there was complete ankylosis; the remaining 5 cases had movement averaging about 30° in range. With the involvement of the soft tissues only, the results were better; 2 cases had almost complete range of movement, and in all the others there was a fair amount, averaging about 40°. We have no records of any case in which excision of the knee-joint was performed. There were 8 cases of dislocation of the internal semilunar cartilage. In all, there was a certain amount of synovitis, which was reduced by massage and faradism. In 4, the internal semilunars were removed, but the ultimate range and strength of movement in these were less than in those treated by non-operative measures. In 5 instances, the patient

complained of pain in the joint, but the discomfort was abolished in only one and by non-operative treatment. Three patients operated on still complained of pain after the operation, although not to such a degree as previously. In 31 cases, synovitis was present without evidence of dislocated internal semilunar, due, in the majority of cases, to contusion of the joint through falling and other similar accidents. The results were good, for in 25 the swelling was completely removed, whilst in the remaining 6 it was greatly reduced. It was found that faradism applied to the quadriceps extensor muscle was very beneficial in removing the synovitis and in strengthening the movement of the joint. The remaining 160 cases of restricted movement of the knee-joint gave good results. This seems to be due, in part, to the fact that splints are not kept applied so long on the lower as on the upper limbs. Further, most patients are very keen to get about, and so consciously or unconsciously exercise and strengthen the joint. As soon as there is anything like firm, bony union and the wound shows no signs of sepsis, it is important to let the patient get about, even if only for a few steps. The one contra-indication is swelling of the joint, and this can usually be controlled by a firm bandage round the knee. Two cases of functional affection of the knee have been treated. In 1, complete recovery was obtained, but this took about six months, and during this time the patient was receiving appropriate treatment in the Mental division of the hospital, which undoubtedly had a great part in his recovery, for it was noticed that the condition of the limb, originally a fractured femur from gunshot wound, varied with the mental state of the patient. The other case showed slight improvement.

Ankle.—147 patients were treated for defective movements of the ankle-joint. In 7 the joint itself was involved, and in each of these ankylosis resulted. In 50 cases the causal lesion was compound fracture in the neighbourhood of the joint, and in 8 of these the resultant movement was almost normal, while in 32 others it was fair, and in one case only was the joint fixed. In 26 instances the defect was due to simple fracture, and in 19 of these the movements had practically returned to normal before the patients were discharged from hospital. In no case was the joint fixed, and in all but one of the others the movement was very fair, with good hopes of becoming greater. There were 16 instances of weakness due to simple sprain or contusion, and all but 5, discharged with but moderate movement, regained practically the full use of the joint. There were 2 cases of functional paresis of the ankle-joint, in neither of which was there any definite improvement. Both these patients had been treated for several months in auxiliary hospitals, and were firmly convinced as to the organic nature of their trouble.

The remaining cases were due to flesh-wounds in the neighbourhood of the joint, and nearly all regained a very full use of the ankle. It is interesting to note that, on the whole, injuries of the lower limbs ultimately do better than corresponding injuries in the upper limbs. I attribute this to the fact that most patients are very anxious to

walk about, and so voluntarily use their lower limbs as much as possible; voluntary movements seem to aid recovery very largely. This appears to be a very cogent argument for the establishment of curative workshops in connection with injuries to the upper limbs. Further, it is common to find on pension-boards that men who have been attempting to work, often obtain a fair amount of use from limbs apparently quite useless after months of massage and electricity.

Bone-plating.—7 patients on whom bone-plating had been performed were treated in the massage department, and it is interesting to note that in 5 on whom massage had been begun soon after the operation, good union was the result, whilst in the other 2, massage having been delayed for some reason, the union was delayed and the limb much weaker.

Nerves.—As patients could not be kept in this hospital sufficiently long after suture of the nerves, we have had no cases of definite recovery. The following is a brief summary of the cases and of the results obtained.

Musculo-spiral Nerve.—32 cases. In 10 of these the lesion was due to concussion, and 8 showed signs of recovery, whilst in 22, in which there was extensive organic injury of the nerve, practically no progress was recorded. There was one instance of crutch-palsy in which treatment resulted in complete recovery, while one of complete dropwrist, following lead-poisoning, showed no improvement.

Posterior Interosseous Nerve.—6 cases. None showed any signs of recovery.

Ulnar Nerve.—64 cases. In 24 the lesion was one of concussion, and improvement was noticed in 17 of these, but amongst the 40 in which there was organic injury, only 7 showed very slight progress, whilst the remainder were stationary; in one, the condition became worse, probably due to the tightening up of scar-tissue round the nerve.

Median Nerve.—28 cases. In 18, due to concussion, half showed signs of recovery, whilst all 10, in which there was fairly extensive injury of the nerve, remained stationary.

Circumflex Nerve.—In 2 instances, the deltoid was found to have no reaction to faradism. In one of these the reaction returned, and a fair degree of active movement resulted, but in the other the muscle remained completely paralysed. In neither case was there any sensory disturbance.

Sciatic Nerve.—9 cases. There were 4 cases of concussion, three of which improved fairly, whilst 3, in which the damage to the nerve-tissue was extensive, made no progress. In 2 instances there was slight palsy due to neuritis, and the results in both were good.

Internal Popliteal Nerve.—26 cases. Amongst the 9 following concussion 6 made some progress, but no improvement was seen in any of the remaining 17, in which the injury was more pronounced.

External Popliteal Nerve.—Only 2 cases were treated, neither of which showed any signs of recovery.

Facial Nerve.—One patient, suffering from Bell's paralysis of toxic

origin, made a complete recovery, and in 4, in which the primary lesion was a gunshot wound, the recovery was partial. One case was functional in nature; there was complete anæsthesia and paralysis of the left side of the face following a small gunshot wound of the left side of the forehead. Some progress towards recovery was noted when the patient was transferred to another hospital.

Rheumatism.—40 cases were treated, and of these 20 received little or no permanent benefit from treatment, whilst the remainder were relieved more or less, one complete recovery being secured. It has to be noted in this connection that the climatic conditions of this part of the country are not suitable for patients with the rheumatic diathesis. The electrical treatment found most useful was ionization, with 2 per cent. potassium iodide; 2 per cent. salicylate of soda had no effect. Radiant heat and stabile faradism were also useful in some instances.

Trench Feet.—20 patients were treated, 12 of whom were more or less completely cured, whilst 6 were greatly relieved. In 2 instances, no improvement was noticed; in 1, atrophic changes in the bone were discovered on X-ray examination, whilst the other appeared to have a functional element. Faradic baths were found the most valuable treatment.

Shell Shock.—33 cases were treated. In 18, pain was a pronounced feature, and 13 of these obtained a great amount of relief, whilst in 2 the pains were somewhat alleviated. Radiant heat was found of some value in these cases. In 15 patients there was some degree of paresis, mostly in the lower limbs; 9 made a complete recovery, whilst the remaining 6 showed definite improvement. Tremor was noted in 7 patients, 2 of whom made a practically complete recovery after treatment, whilst 4 became much less tremulous. In 2 instances, in which aphonia was the chief trouble, strong faradism applied to the larynx failed to produce any beneficial effect.

Neurasthenia.—13 patients were treated by general massage. Of these 4 made almost complete recoveries, whilst the remaining 9 had made good progress when discharged from hospital.

I am indebted to Lt.-Col. Simpson, R.A.M.C., for permission to publish this paper, and to Major G. Sichel, F.R.C.S., R.A.M.C., O. in C. Surgical Division, for many suggestions and for the advice which he has given me in running the department. I have also to thank the members of the Almeric Paget Corps, to whom, in no small measure, is due such success as we have been able to achieve.

A REVIEW OF RECENT ADVANCES IN DENTAL SURGERY.

By F. N. DOUBLEDAY, L.R.C.P., M.R.C.S., L.D.S.

Dental Surgeon, King George V. Military Hospital; Senior Demonstrator of Practical Dentistry, Guy's Hospital; Editor, British Dental Journal.

THE main interest of dental surgery at the present times is naturally the treatment of gunshot injuries of the jaws. This is a matter which is of real importance both to the specialist and to the general practitioner of medicine, because after the war so many patients suffering from these lesions will be found among the community, and the question of the extent to which general illness and debility are attributable to deformities of the jaws and soft parts will not be easy to solve. It is to be hoped that a dental specialist will be appointed to every Pensions Board to assist in the assessment of the disability caused by such injuries, and to advise as to the probable benefit to be derived from the further operative or prosthetic treatment of pensioners. But there will remain a large number of cases in which the medical or surgical specialist in a hospital or the general practitioner in the country will need some new standards to guide his judgement in the new conditions which have arisen as the result of jaw injuries.

In 1916, J. F. Colyer[1] laid down that as early as possible all teeth and roots involved in the lines of fracture should be removed so that all possible sources of infection should be eliminated. Most recent dental writers adhere to his principle, but some have dissented from it. Pickerill, Paton Pollitt, and Stephens[2] have shown cases in which bony union of the jaws had been obtained, although the teeth were involved in comminuted areas. Upon this it must be observed that union of the fragments has probably ensued in spite of these sources of infection. The final skiagrams shown in connection with the cases made it evident that very little bone had been formed round the teeth and the study of the pathology of other diseases has shown that alveolar bone which has been destroyed is not reformed, and it would therefore appear that the prognosis in respect to these teeth is poor. Undoubtedly on occasion, teeth, otherwise unsaveable, may be utilized as a retention for a dental splint where no other hold is obtainable, but the general principles of surgery suggest that where a tooth is simply serving to keep open a compound fracture of bone its removal, and the resulting elimination of this source of external infection by healing of the tooth socket, is the sound line of treatment.

Colyer[3] has shown that, in gunshot fractures of the jaws, the

fractures are frequently stellate and spread far beyond the apparent region of the injury ; their ultimate ramifications are only to be discovered by accurate skiagrams taken in several planes.

Although a variety of modifications are employed, the use of metal cap splints, covering the teeth, has become by far the most common pattern, replacing wire splints, such as the Hammond, which before the war figured in the text-books.   There is some difference of opinion, whether splints should be made in the closed or open bite position. Frequently the jaws are closed by interdental splints covering both upper and lower jaws, the splints being closely united; by this means the normal articulation of the teeth is more readily secured.   Against this method it is alleged that the feeding of the patient is made more difficult, and that partial or complete ankylosis of the temporo-mandibular articulation may ensue.   The present writer has used the closed bite splint in a large number of cases during the war, and has never experienced these difficulties.   The opening of the jaws, by splinting them in an open bite position is advocated by C. H. Bubb,[4] who recommends its use for the following reasons :—

1. It facilitates the feeding of the patient and the irrigation of his mouth.

2. Prevents trismus.

3. Facilitates the intra-tracheal administration of ether.

The closed bite splint may be of two types :—

(a) Two double metal caps soldered together, and covering a sufficient number of maxillary and mandibular teeth. This splint may be fastened to the teeth by a strongly antiseptic cement, such as oxyphosphate of copper; or it may be fitted loosely on to the teeth, the jaws being held to it by bandages. It may then be removed for the cleansing of the mouth and examination of the parts, but it is liable to unauthorized removal by the patient.

(b) It may consist of two separate caps, cemented to the upper and lower teeth, the jaws being united by stout wire ligatures fastened in a figure of eight to hooks upon the splints. This form permits ready opening of the mouth for cleansing or inspection by the dental surgeon, but it is not easily interfered with by the patient.

The open bite splint consists of two similar metal caps cemented to the teeth; but at right angles to these caps, standing vertically, are stout metal flanges, separating the jaws by about 2 cms. in the midline. The flanges from the upper and lower caps lie beside each other and are united by a screw, which can be removed by the surgeon when it is desired to open the mouth further for purposes of examination or treatment.

THE CONTROL OF THE POSTERIOR FRAGMENT.

In many cases of gunshot injuries of the jaw, there is a considerable

loss of bone in the molar region. A posterior fragment, consisting of the ascending ramus with a small portion of the horizontal ramus, is left. This fragment frequently has no tooth upon it; it becomes displaced inwards by the action of the internal pterygoid muscle and the posterior fibres of the mylohyoid, and is pulled forwards and upwards by the unopposed action of the elevator muscles of the same side. These fragments are most difficult to control, and if allowed to become fixed by scar-tissue in a bad position are only reduced with great difficulty. All writers emphasize the importance of the early fixation of these fragments. The following methods of dealing with the problem are suggested. Where the loss of bony tissue does not exceed 2 to 3 cms. the posterior fragment may be allowed to swing forward and unite with the anterior fragment, which is fastened to the upper jaw with an interdental splint.[5]   C. H. Bubb[6] applies to the posterior fragment an extension of his mandibular splint. This extension is lined by soft rubber and rests upon the gum, the gap in the continuity of the bone being closed by a bone graft.

H. P. Pickerill has described a method by which he fixes the posterior fragment by means of an open operation. A screw is passed through the malar bone in such a manner that the coronoid process of the mandible is held down and the forward movement of the fragment is prevented.[7]   W. H. Dolamore[8] has recorded a case in which the posterior fragment was maintained in position by a method elaborated by Bruhn and Lindemann in Germany. The following technique is described : A curved incision is made, the lower border of the bone exposed, and the periosteum separated from its inner surface. A hole is drilled from the facial surface through the cheek and bone, and through this the wire or needle is passed. This wire is fixed on the inner side to a plate, placed between the bone and its periosteum, whilst externally it projects beyond the facial surface, being fixed by a nut, screwed over it on to a thin tin washer. The tissues are then replaced and the wound closed. The wire projecting on the facial surface is joined to a bar, the other end of which is soldered to a splint, fixed to the molar teeth. Thus the two mandibular fragments are immovably fixed.

BONE GRAFTING.

This is the subject of all others which is engrossing the attention of surgeons and dental surgeons engaged on jaw surgery. The Odontological Section of the Royal Society of Medicine intend to devote the greater portion of their forthcoming session to a thorough consideration of this question, because it is increasingly evident that a very considerable number of patients can only hope for a restoration to comfort and to a functional use of their jaws by this means.

The subject has been dealt with in a masterly and exhaustive manner by Cole.[9]   Both this author and Bubb, his co-worker, possess dental qualifications, and both have worked together as a team for several years. To this is to be ascribed their remarkable

success in bone-grafting and in plastic surgery. These workers have constantly emphasized the necessity for collaboration and for mutual understanding between surgeon and dental surgeon. In these joint operations the dental appliance forms the fixed basis, or scaffolding, upon which the surgeon works. The dental splint is only capable of very limited modification at, or during the time of, operation. It follows that the aims and probable course of the operation must be carefully considered by both surgeon and dental surgeon, and that during its performance the dental surgeon should appreciate the necessity for rigid asepsis, if the surgical part of the work is to be a success, and that the surgeon should remember that dental appliances are only capable of bearing a certain strain and a slight amount of modification at operation. The results, which may be obtained when attention is paid to these points, have been proved to be really admirable in the large number of patients, who were shown at three separate intervals by Cole and Bubb during the past year.

Cole[10] has described two chief methods of grafting pedicle bone slides from the anterior part of the mandible, which are used when the loss of substance is not too great, and rib-grafts which are used when a considerable portion of the mandible has been lost. Those who desire to follow the details of these operations should turn to the original papers to which reference has been given. It will be sufficient here to note the emphasis laid by Bubb on the use of the open bite splint, and to the advantage gained by the intra-tracheal administration of ether by the Shipway method for these operations. Another series of eight cases have been reported by Platt, Campion, and Rodway.[11] In five of these, rib-grafts were employed; in two, tibia; and in one, scapula. In four cases, the results appear to have been completely successful, in three they were fair, and in one treatment was not complete when the results were published. These cases were all operated upon in 1917.

TREATMENT OF EXTENSIVE LOSS OF BONE BY DENTURES.

Kazanjain[12] and Burrows have published accounts of cases in which a large part of the mandible has been lost, and has been replaced by vulcanite dentures. Plastic operations are then performed to replace the soft parts which had been destroyed. These authors agree with the others in emphasizing the importance of retaining in normal position bony fragments of the mandible which remain, so that the fragments shall not become displaced by scar-tissue. They employ temporary vulcanite dentures for the purpose, later replacing them by permanent prosthetic appliances. Many of the appliances figured are ingeniously made in sections, to facilitate their removal. The main conclusions arrived at by these authors are as follows :—

1. The preservation of the surviving portions of the mandible in the desired position.
2. The substitution of lost bony tissues by vulcanite appliances

before the performance of plastic operations on the soft parts.
3. Postponement of the main plastic operation until suppuration has ceased, and the patient is in a good physical condition.
4. The use of a similar scheme of flaps in all cases.

It seems probable that bone grafts rather than dentures will be preferred for this type of case in the future.

In another communication, Kazanjain[13] recommends the following treatment for cases of extensive comminuted gunshot wounds of the mandible. A stout wire, fastened to the remaining fragments of the mandible by appropriate means, is constructed in an arch above the mandibular teeth, or the site which they formerly occupied. The larger comminuted fragments are then exposed, and fastened by lengths of thin ligature wire to the arch above. This seems a procedure of somewhat doubtful surgical utility, but it is claimed that comminuted fragments of bone are placed and kept in good position in this way, and that they eventually become embedded in the ensheathing callus and so help to reform the continuity of the mandible.

THE RESULTS OF TREATMENT.

Some interesting statistics are now available dealing with the results of treatment. The following tables are collected from the papers referred to in this communication.

TABLE I.

Author.	Hospital.	Date of Paper.	No. of Cases.	Returned to Duty.	Discharged.	Percentage of Non-union.	Deaths.	Still under Treatment.	Transferred to other Hospitals.
Mumby, Forty, and Shefford.	2nd Northern General, Leeds.	July, 1918.	200	175	13	See Table II.	1	—	7
Grandison	1st Southern General, Birmingham.	Feb., 1918.	672	300	27 (8 for non-union, 19 for other injuries).	—	—	325	20
Northcroft	1st London General, Camberwell.	Dec., 1917.	248	—	110 to Army and as pensioners.	12	2	116	20
Bubb and Cole	King George V., London.	April, 1918.	270	—	—	10	—	—	—

Mumby, Forty, and Shefford also publish a table of the results of treatment in a series of 95 cases of non-union which came under their treatment after an average period of ten months had elapsed since

the receipt of the injury.	This table is as follows : —

<div align="center">TABLE II.</div>

Result.	Number.
Bony union - - - - - - - - 80	
Non-union, angle - - - - - - - 1	
,, lateral - - - - - - - 5	
,, mesial - - - - - - - 2	
,, multiple - - - - - - - 2	
,, ascending ramus - - - - - 5	
	95

These results can scarcely be compared one with another, because so much depends upon the nature of the injury, the general condition of the patient as affecting his reaction to injury, and the length of time which has elapsed since the receipt of the wound.	Greater stress than ever needs to be laid upon the intelligent co-operation of surgeon and dental surgeon in this work, upon the early transference and segregation of these cases immediately upon receipt of their injury, and upon more efficient examination and treatment of pensioners who were discharged before experience and research had led to the present advances in treatment.	Facial deformities are far more distressing to the patient than are most other injuries, both as regards his self-respect and his ability to nourish himself and to keep fit for work.	But, with increasing knowledge and care of the patients by specialists, we may now feel confident that their misfortunes can be greatly alleviated.

<div align="center">REFERENCES</div>

[1] *British Dental Journal*, 1916, p. 185 of War Supplement.

[2] Bubb : *Proc. Roy. Soc. of Med.*, April, 1918.	Pickerill : *Proc. Roy. Soc. of Med.*, June, 1918.	Stephens : *Proc. Roy. Soc. of Med.*, July, 1917. Paton Pollitt : *Proc. Roy. Soc. of Med.*, July, 1917.

[3] *British Dental Journal*, 1917, p. 61, *et seq.* of War Supplement.

[4] *Proc. Roy. Soc. of Med.*, April, 1918.

[5] Colyer : *British Dental Journal*, 1916, p. 193 of War Supplement.

[6] *Proc. Roy. Soc. of Med.*, April, 1918.

[7] *Proc. Roy. Soc. of Med.*, 1918.

[8] W. H. Dolamore : *Pro. Roy. Soc. of Med.*, May, 1918.

[9] Hunterian Lecture published in *Journal of Surgery*, July, 1918; *see also* Pro. Roy. Soc. of Med., April, 1918.

[10] *Locus cit.*

[11] *Lancet*, March 30, 1918.

[12] *British Journal of Surgery*, 1918.

[13] *Pro. Roy. Soc. of Med.*, June, 1918.

CASE OF FRACTURE OF CERVICAL VERTEBRA: AFTER-TREATMENT BY MECHANO-THERAPEUTICS.

By EDGAR F. CYRIAX, M.D.

On examining the literature on fractures of the vertebral column, especially of its cervical portion, it is very rare to find any mention of mechano-therapeutics as a method of treatment, either immediate or remote. This is the case even in the works of authors who are enthusiastic in recommending such treatment for fractures of bones of the limbs. I have searched in vain for reports of cases in which such treatment has been employed to the exclusion of others, so that its efficacy may be judged on its merits. Enquiries amongst workers in massage departments in military hospitals have practically always received the same answer, namely, that fractures of the vertebral column are hardly ever sent in for treatment; the annual reports of such departments confirm this. I think I am right in saying that most medical men who wish mechano-therapeutics to be employed in such cases will only allow the very lightest effleurage to be applied, all forms of passive (let alone active) movements of the vertebral joints being strictly prohibited. It appears that the ordinarily accepted principles underlying the theory and practice of mechano-therapeutics for fractures of the bones of the extremities are not considered applicable to cases of fractures of the vertebræ. Personally, I cannot see any reason why this should be the prevalent opinion; I consider that the latter cases stand in as great a need, if not indeed a greater one, of rational movement therapy than do the former.

As regards fractures of cervical vertebræ, I have treated a number of such cases with mechano-therapeutics at varying periods (two months to four years) after the actual date of the injury, and have in every case found that great benefit, sometimes an absolute and permanent cure, was the result. As regards the actual manipulations applied, these varied somewhat in each case, but the following may be taken as a general scheme :—

(1) Manual vibrations (H. Kellgren's method) applied to the neck.

(2) Deep petrissage of the neck muscles, specially over the site of the injury.

(3) Repeated passive elongation and shortening of the neck as a whole.

(4) Frictions (H. Kellgren's method) on the posterior cervical nerves.

(5) Passive flexion, extension, lateral flexion, and rotations. In the case of adhesions these can gradually be broken down, as with joints elsewhere, by the usual series of small, jerky movements applied through a very small radius.

(6) The same movements as in (5), but performed against resistance

from the operator.

Just as with fractures of the limbs, the treatment must be administered gently to begin with, and increased in energy and otherwise modified as improvement sets in. Beyond a possible slight transient pain when adhesions are broken down, not only is no unpleasantness caused by the treatment, but generally a sense of relief and comfort ensues, and several of my cases have looked forward with pleasure to the next application.

I append a report of a case, which I have chosen partly because of its X-ray findings and partly because no local treatment except mechano-therapeutics for the neck had been employed, so that the results rest entirely on their merits.

Private ——, came to me on February 26th, 1918. History : He received a gunshot wound of the head during December, 1914, which did not heal properly ; it was operated on about three weeks later, and a piece of shrapnel extracted. The wound healed after this, and he returned to the firing line during March, 1915. During May, 1916, he received gunshot wounds of the right shoulder, right wrist, and hand, which kept him from the firing line until about September, 1916. During October, 1917, a shell burst near him, burying him completely except his head and one shoulder. He was, however, unable to extricate himself, and suffered from great difficulty in breathing on account of the weight on his back ; he was semi-conscious until dug out some fourteen hours later. When this had been done he found himself unable to walk, felt very giddy, and suffered from intense pains in the head and back ; he was very dazed, and his memory was very bad. He was taken to hospital in France, where he remained for three weeks, after which he was sent to hospital in England, where he remained for ten weeks. During this period the headache and dizziness continued, but his legs greatly improved, so that he was able to get about, although at times this was difficult, and he felt very shaky. On two occasions his legs gave way, and he fell. During his stay in hospital in England, high frequency was employed daily on the dorsal and lumbar regions, and benefited him considerably as regards the back, but made no difference to his head. No skiagrams of the neck appear to have been taken. On February 14th, 1918, the patient was discharged from the army ; his discharge paper, dated March 7th, 1918, states that this was done on account of gunshot wound of the head, injury to the back, gunshot wounds of the right shoulder, wrist and right hand, loss of toes, and neurasthenia. The neck condition was not mentioned.

Examination : The patient suffers from periodic attacks of pain, which generally come on in the morning ; they begin by neuralgia in the right temple, which becomes more acute and spreads downwards over the right side of the face. The pain once established is very intense, and after lasting about half-an-hour, is followed by general headache and dizziness. This continues for the rest of the day, and disappears at night-time when he goes to bed. Attempts to move, especially stooping, aggravate the headache and dizziness, but they are improved by sitting still ; in fact, on some occasions he has partially warded off an attack by sitting perfectly still when it was just beginning. At intervals he suffers from " electric shocks " passing up and down his neck, which make him feel very ill. Shooting pains in the right shoulder are sometimes experienced, but appear to bear no relation to the headache or dizziness. Neither is this the case with attacks of tinnitus aurium, which, lasting about half-an-hour, come on

about two or three times daily; these are induced by hearing a noise, or by somebody speaking to him unexpectedly; sometimes stooping brings them on.

The patient holds his head stiffly, somewhat inclined to the right, and protruded. There is great rigidity of all the cervical muscles, and both this and the pain in the neck are aggravated by movements, especially rotary ones. On active rotation of the head to the right, his neck sometimes " locks," and remains immovably fixed for about a minute, after which the pain suddenly disappears and he is able to turn it back, or else a paroxysm of pain comes on, causing his head to drop forwards; after this he is able to bring it back to the erect position once more. Passive rotation of the neck is fairly free to the right and can be performed through about 60°, but to the left it is limited to about 20°. In both cases, efforts to carry these movements further cause intense contraction in the cervical muscles and a good deal of pain. By gentle petrissage of these muscles they can be partly relaxed, and rotation to the left can then be passively performed through about 45°, after which acute pain ensues in the suboccipital region. When very slight amounts of passive rotation in either direction are performed during the maintenance of continued elongation of the neck, intense pain is induced, and the patient immediately puts both
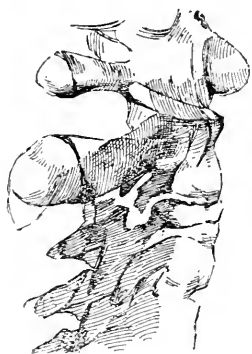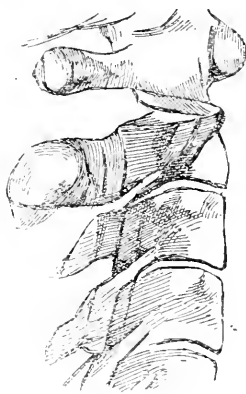
Fig. 1.   Fig. 2.

hands up to his head to hold it still. (This symptom is practically diagnostic of adhesions.) Flexion and extension of the neck on itself are free, and cause very little pain. Coarse grating movements arise in the neck, especially with passive rotations; the patient himself localizes these to the region of the third cervical vertebra. There is general tenderness on pressure over the whole of the posterior cervical region, particularly over the third cervical spine and to the left of the fifth cervical vertebra. A skiagram of the neck, kindly taken for me by Dr. Stanley Melville, showed a fracture of the body of the third cervical vertebra, with new bone formation (*see* Fig. 1). An examination of the back revealed the signs of an old contusion at the level of the first and second lumbar vertebræ; the skiagram of this region was negative.

Reflexes: The eye reactions are good; slight biceps and triceps jerks in both arms; patellar reflex normal on both sides. No rectum or bladder symptoms. The tongue is tremulous on protrusion. He does not walk

well, for he is shaky when he attempts to do so, and gets tired very soon. There are no difficulties as regards movements of the arms. He tells me that he sleeps badly, seldom obtaining more than two hours' sleep during the night, and he is never able to sleep during the day. His memory is still bad, but is improving slowly. Blood-pressure, as estimated with Martin's Riva Rocci's apparatus, is 104, 64.

The treatment administered to the head was on the lines indicated above, and was applied on twenty occasions between March 8th and May 30th. Various active and passive movements for the contusion of the back were also applied during the first ten visits, after which they were discontinued, for the back had recovered.

Progress : At the second visit on March 11th some cervical adhesions were broken down, and this was done at every subsequent visit until May 21st, after which there were none left. The movements of the neck improved coincidently with their removal. March 26th : no more headaches or dizziness unless the patient moves about quickly. The neuralgic attacks in the temple and face are much less acute. March 30th : the patient is so much improved that he was enabled to work as full-time messenger to a hospital. May 21st : no limitation of neck movements; general condition very good. Blood-pressure, 112, 68.

May 30th : the treatment was administered to-day for the last time. The condition of the head and neck is markedly improved. There is no longer any neuralgia or headache, and dizziness only ensues in a very moderate degree when he stoops. No " electric shocks," shooting pains in the shoulder or tinnitus. The head is not held stiffly, there is no rigidity of the cervical muscles, no pain and no tenderness on pressure. His neck never " locks " any more, and all the movements in the cervical region are free and no longer show the limitations mentioned. There are no signs of adhesions, and none of the coarse grating movements mentioned. A second skiagram of the neck, taken on May 22nd, shows that the line of the fracture is no longer distinguishable, and that the new bone formation has disappeared (*see* Fig. 2). The reflexes are practically as before; the tongue is not tremulous on protrusion. His walking powers are quite good, and he is able to carry fairly heavy boxes up and downstairs. He now sleeps seven hours during the night without waking. His memory is somewhat better, but leaves much to be desired. Blood-pressure, 108, 58.

The patient came again to see me on June 27th. He had just recovered from an attack of acute orchitis which had somewhat weakened him. There has, however, been no return whatever of the neck symptoms; in fact, instead he has been improving. He told me that he was recently able to carry a box, weighing three-quarters of a hundredweight, up some stairs, balancing the box on his head, which was his ordinary method of carrying weighty packages before enlisting. His memory is improving slowly.

THE ESSENTIAL FEATURES OF A SUCCESSFUL MATERNITY AND CHILD WELFARE SCHEME FOR THE SMALLER TOWNS.

By R. H. DEANS, M.B., D.P.H.

Medical Officer to the Maternity and Child Welfare Centre, Winsford.

THE importance and popularity of Child Welfare Work, at first under the patronage of voluntary organizations, but latterly under the compulsion of the Local Government Board, has led to the drawing up of Maternity and Child Welfare Schemes all over the country.

Now, although the L.G.B. may issue model schemes and reserve to itself the approval of all local schemes, a short article on the essential features of a successful scheme specially suited for any of the smaller towns may be welcome at the present time.

I.—THE CHILD WELFARE CENTRE.

The establishment of a centre or centres is the first step, but it cannot be urged too strongly that the mere establishment of a successful centre is not the beginning and end of the whole scheme. The centre, as its name implies, is merely the centre or hub of the scheme, *i.e.*, the headquarters from which the different parts of the scheme will radiate.

The centre itself should consist of at least two comfortable rooms, one a small room as medical officer's consulting room, and the other a much larger room as a general room in which mothers and children can wait, in which the children are dressed and undressed, and in which the mothers can enjoy a cup of tea whilst waiting. In one corner of the large room the babies can be weighed and measured. This room can also be used for small lectures to mothers, demonstrations, or mothers' meetings. A shelter or shed should be provided for " prams " in case of wet weather. The furniture of the consulting room should consist of M.O.'s desk, M.O.'s chair, two ordinary chairs, an examination couch, small sterilizer, and a few instruments (*e.g.*, tongue depressor, throat, nose, and ear instruments, pelvimeter, vaginal speculum, etc.), file cabinets for record cards, wash-hand basin, urine testing apparatus, and diagrams for the walls. The furniture of the large room should consist of weighing machine (to weigh accurately to 2 drachms), height measures (one ordinary height measure and one specially for babies), a large table (for cutting up bread and butter and making tea, also for demonstrations of cutting out babies' garments, etc.), two small collapsible tables on which tea could be served to the mothers, one dozen or more chairs (half of which should be low nursing chairs), blankets, baskets (to hold each baby's clothes), wash-hand basin, kettle and crockery, table covers, fireguard, gas ring, and (preferably in a passage) a slop stone for washing up tea things. The walls should be decorated with appropriate and instructive diagrams.

The chief work done at the centre should be the holding of a clinic

at stated intervals—usually weekly. The M.O., health visitors, and two or three voluntary workers attend, and the mothers are asked to bring their babies. If there is no separate clinic for maternity work, then pregnant women are also asked to attend for examination and advice. The work of the clinic may be subdivided thus :—

(*a*) The babies and, where necessary, the mothers are thoroughly examined by the Medical Officer on their first visit, and the necessary advice as to feeding and clothing, etc. given by the Medical Officer to the mother. The mother is told when to bring the child again to see the Medical Officer, and meanwhile to bring the child up for regular weighing.

(*b*) Regular weighing of all children should be done, say, once a week up to three months, monthly from three to twelve months, and thereafter at less frequent intervals up to five years. The weighing can be done by a health visitor or nurse specially trained in child welfare work, and here many little faults may be discovered which otherwise would have passed unnoticed till a later date. Babies who are not thriving should of course be weighed at more frequent intervals as directed by the M.O.

(*c*) Whilst the clinic is in progress, a cup of tea may be served by the voluntary workers to the mothers. The cup of tea and a little homely chat will be much appreciated by the average mother.

(*d*) Small demonstrations and lectures should be given at, say, monthly intervals to mothers on the making and cutting out of babies' garments, the proper method of feeding, etc.

These demonstrations might more conveniently be given in the evening apart from the clinic.

(*e*) The supply of fresh cows' milk, dried milk, cod-liver oil emulsion, etc., to necessitous mothers, at cost price.

II.—THE MEDICAL OFFICER.

The M.O. should generally supervise and co-ordinate the whole scheme. He should attend at the clinic as already described, keep a record of his findings on a specially drawn up card after examination of each case, and of the advice he has given. The record card should, if possible, be of such a design as to include a continuous record of the child from its first visit to the clinic up to five years of age. At five years of age, the record cards might well be handed over to the school medical inspector. The M.O. may also, at the close of each clinic, transmit to each practitioner in his area a list of the practitioner's patients who have attended the clinic, together with a *résumé* of the advice he has given them. Each practitioner is thus kept in touch with the clinic, and his co-operation in the work thereby secured.

III.—THE HEALTH VISITOR.

The health visitor (or visitors) is an essential of the scheme, and the general work of health visitors is already well known and appreciated. Special training in the work is necessary, and, apart from attending at the clinic, a tactful visitor can accomplish a great deal of useful work by giving advice to mothers and prospective

mothers in their own homes, by seeing that the instructions of the M.O. are carried out, and by impressing on mothers the importance of coming to the centre for regular weighing of the baby and, if necessary, to consult the M.O.

IV.—THE VOLUNTARY WORKERS.

Here we have a *sine qua non* of a successful scheme, but they must be kept carefully to their proper sphere of work. It would make things work ever so much more smoothly if, at the beginning of a scheme, the M.O. were to give one or two lectures to the workers on the working of the scheme in general and on their particular part in it. The voluntary workers should be drawn from all classes and denominations. Their sphere of work, in my opinion, should consist in attending at the clinic to prepare and serve the tea, to help the mothers to dress and undress the babies, and generally make the clinic as homely as possible. They should also endeavour to arrange and attend the demonstrations and, generally speaking, advertise the benefits to be derived from the scheme on their daily rounds. It should be no part of their work to give technical advice regarding the feeding or clothing of particular babies. One of the voluntary workers might, as at our clinic here, act as secretary or clerk to the M.O.

Now these are the usual features of a Child Welfare Centre, but, as has already been said, the centre is not the whole, and, for a completely successful scheme, there are one or two other features which are absolutely essential if the real good of such work is to be gained.

V.—A PROPER AND EFFICIENT MIDWIFERY SERVICE.

An adequate supply of trained midwives should be provided in each area. In many areas too much of the midwifery is done by untrained women of the " Sarah Gamp " type. Such women are a hindrance to any scheme, firstly, because they are not qualified to give proper advice to pregnant women, and at a confinement they practically court sheer murder by having no knowledge of such elementary principles as the use of antiseptics, taking of a temperature, pulse, etc. They leave difficult cases to the last moment before sending for medical assistance, and generally, in my opinion, are the cause of a large percentage of the early or neonatal mortality. The second reason why they are a hindrance to the scheme is because they have a natural antipathy to child welfare schemes, for they surmise, and I hope correctly, that such schemes mean very soon the absolute extinction of " Sarah Gamp." Proper provision for safe midwifery, then, is essential, and it should be the object of all the workers, from the M.O. downwards, to urge on prospective mothers the importance of engaging a properly trained midwife, and the workers should be in a position to recommend such midwives to the prospective mother. Such provision can usually be made by arrangement with the local nursing association.

VI.—INSTITUTIONAL ACCOMMODATION FOR SPECIAL CASES.

There are babies which, do what you will in the way of advice, etc

to the mother, still go downhill.   " The best laid schemes o' mice
and men gang aft agley."   It may be that the mother's milk supply
is insufficient.   Then, as Dr. Truby King advises, the mother and
child should be kept under observation for 24 hours, and the child
weighed before and after each feed during that period.   Then we
can form an exact estimate of how much food the child is receiving,
and therefore how much it requires in addition to the mother's milk.
Or, if the child is artificially fed, its downhill course may simply be
due to the carelessness of the mother in attending to the many details
of artificial feeding.   Then a week or two under proper care in an
institution soon puts the baby on the right road again.   Such pro-
vision might usually be made by arranging for one or two cots in
the local cottage hospital.   Similar arrangements might be made for
special maternity cases.

VII.—PROPAGANDA WORK.

This should consist of lectures on Maternity and Child Welfare,
illustrated, it may be, by lantern slides.   Small meetings for this
purpose could be held in the large room of the centre and larger
meetings in some larger public building.   Practical demonstrations
on cutting out babies' and children's garments and on the proper
methods of preparing children's food, etc., should also be arranged,
and arrangements made for an annual baby show or a visit to the
town of one of the various Mothercraft and Child Welfare Exhibitions.

The above might well be considered to constitute the necessary
parts of a successful scheme, but there are two more points which,
if not essential parts of a successful scheme, are, in my opinion,
absolutely necessary for its foundation.

The first of these is an energetic public health department.   I think
it is universally acknowledged that a very large amount of infant
mortality is due to unhealthy and unclean homes and houses, and
therefore I say that if the health department is weak enough to allow
or to wink at overcrowding, dirty, filthy houses, and various nuisances,
then, in my opinion, the scheme might well be abandoned.

The second point I wish to draw attention to, and it arises out of
the first, is the necessity for an energetic and sympathetic Government
department.

It may be said that it is all very well to insist on larger houses,
proper feeding, and clothing of children, but where is the average
working man to find the money if he has a large family.   Well, surely
it is the duty of a Government department to tackle that problem.
Let the Government department insist on a man receiving a sufficient
wage to house, feed, and clothe a family properly, but let them insist
in return that the wage will be spent for these purposes and not
squandered on drink and in other ways.

When we get such a department to insist on these points, and when
we get a health department keen enough to see that they are carried
out, then we will have a real foundation on which the other activities
of a Maternity and Child Welfare Scheme can build, and the result
will be a healthy, wholesome youth, just what the nation wants, and
what every Maternity and Child Welfare Scheme ought to set out to

obtain. The following illustrations show convenient forms of record cards.

Name Address				Doctor.		Father. Occupation Health		Mother.
Date.	Age.	Weight.	Height.	Diet.	Nutrition or Cleanliness.	Signs of Disease.	Remarks.	

I.—*Specimen record card (front—top portion). Actual size* $7\frac{1}{4}'' \times 5\frac{3}{4}''$. *An entry is made on this card each time the medical officer sees the child. Space for* 20 *such entries is provided, which is usually sufficient from infancy to five years of age.*

Name..................................... *Date of Birth*..................... 19...

Height in Inches.	Lbs.	Month of Age.										
		1	2	3	4	5		7	8	9	10	11	12
	24											
	23											
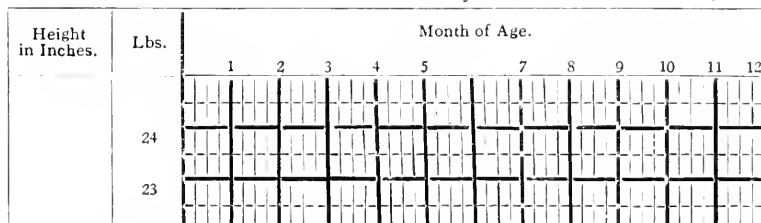
II.—*Specimen record card (back—top portion). This should show the normal weight curve for* 12 *months, and provision is made for the charting of the baby's weight each week, if necessary, during that period.*

Maternity and Child Welfare Centre.

From M.O. to the Centre to Dr.   , of   .

The following is a list of your patients who attended at the Centre on   , 19 . The general nature of any hygienic or dietetic advice given to them is indicated in the columns opposite their names. When any diseased condition specially calling for attention was noted, it is stated in the right-hand column on this sheet. In each such case the patient or the patient's friends were instructed to seek your advice and treatment. The Health Visitor will be glad to assist in seeing that any instructions you may give are carried out.

Surname,	Christian Name.	Age. Yrs. Mths.	Address.	Height. Ft. Ins.	Weight. Lbs. Ozs.	Diet.	Hygienic and Dietetic Advice.*	Attention is called to

* Any special advice given to be stated on separate slip.

III.—*Specimen form on which a list of his patients is sent by the medical officer of the centre to each practitioner. Actual size* $13'' \times 8''$.

THE TREATMENT OF MALARIA—TWO METHODS AND THEIR COMPARATIVE RESULTS.

By J. H. K. SYKES, L.M.S.S.A.

Temporary Captain, R.A.M.C.

WITH a view of ascertaining the comparative efficacy of the large and small dose treatment of malaria by quinine combined with adrenalin and pituitrin as provocative agents, the following methods of treatment were employed simultaneously.

The patients, as they were admitted to hospital, were placed in one of two groups, A and B. All the cases were of old standing, the duration of the disease varying from eight months to two years and eight months, and they were all cases of undoubted malaria.

The treatment extended over three weeks and that common to both groups was as follows :—The patients were kept in bed the first week. Allowed up half day the second week, and all day the third week, with physical exercises and route marches. On admission, quinine sulphate, gr. xx, and aspirin, gr. x, were given. At night calomel, gr. iii, followed in the morning by mist. alba. All the quinine administered was in solution. The mixture—

$$\text{R} \quad \text{Ferri et ammon. cit.} \quad \text{-} \quad \text{-} \quad \text{gr. x.}$$
$$\text{Liq. arsenicalis} \quad \text{-} \quad \text{-} \quad \text{-} \quad \text{m. iii.}$$
$$\text{Aquam ad} \quad \text{-} \quad \text{-} \quad \text{-} \quad \text{-} \quad \text{\textofon. i.}$$

was given three times a day after food during the three weeks, the liq. arsenicalis being increased by one minim at the beginning of the second and third week. On the temperature becoming normal, the patients were placed on ordinary hospital diet.

As before mentioned, the patients were placed in groups A and B, and, in addition to the common treatment as above, the special treatment of each group was—

GROUP A.

First week.—Twenty grains of quinine sulphate were given daily, four hours before expected attack.

Second and third weeks.—Three grains of quinine sulphate were given every three hours throughout the twenty-four.

An hypodermic injection of pituitrin, o·5 cc., was given every fourth day, two hours before the administration of the quinine.

GROUP B.

First week.—Twenty grains of quinine sulphate were given daily, four hours before the expected attack.

Second week.—The dose of quinine was reduced to 17½ grs.

Third week.—The dose of quinine was reduced to 15 grs.

Adrenalin m. 15 was given one hour before the quinine was administered every fourth day.

On discharge each patient was given :—

1. Tablets of quinine sufficient to carry him over a few days.
2. A note to the M.O. of his unit asking his co-operation, and requesting that the patient should receive 60 grs. of quinine weekly, if possible, in daily doses of 10 grs., excepting Sundays, until three months had elapsed since the last attack.
3. A stamped addressed post-card giving the date three months from his last attack and instructions to post it if he had a relapse, with temperature, before that date.

In both groups patients improved rapidly in their general condition, and in nearly all cases weight was gained. Many of the patients volunteered the statement that they had never felt so well since they had contracted the disease.

In group A, there were six patients who had contracted the disease in East Africa, and eleven in Salonika, the case of longest standing had had the disease two years eight months, and the case of shortest duration was one of eight months. The interval between the attacks had varied, according to the statements of the patients, from one to four weeks. In this group, twelve patients relapsed within three months, 72 per cent.

In group B, four had contracted the disease in East Africa, eleven in Salonika, and one in India. The longest standing case was one of two years one month, and the case of shortest duration was one of ten months. The interval between the attacks had varied, according to the statements of the patients, from one to four weeks. In this group, of the twelve who have gone over the three months, three only have relapsed, 25 per cent. Five patients have gone over two months without relapse, which brings the percentage of relapses in this group still lower.

The figures are very striking, and I cannot think that the administration of pituitrin or adrenalin caused the difference in the results of the two treatments. Ruling this out, it leaves only the difference between the large dose of quinine and the frequently repeated small doses. The result is so much in favour of the large dose, contrary, I must confess, to my previously conceived opinion, and also so much better than I have previously obtained by intramuscular injection of quinine in old standing cases (without the pituitrin or adrenalin) that I venture to publish these results. If patients could be treated quite early, according to the method employed in group B, the results should be even better than that obtained above, and the percentage of actual cures should be high.

A FOREIGN BODY (A LIVING FISH) IN THE PHARYNX.

By MOH. ZAKY SHAFEÏ, D.S.M.C.

M.O., Mansoura, Egypt.

EVERY practitioner meets with cases of foreign bodies in the pharynx, larynx, or œsophagus, such as a coin, bonbon, tooth, piece of meat-bone, or fish-bone, but rarely with a case of the entrance of a living fish in the pharynx.

At noon of August 23, 1918, a group of people came to my clinic, carrying a boy, Aboudy Morsi by name, eight years of age, from Talkha, a town on the opposite side of the Damietta branch of the Nile. The boy was nearly dead, and they related to me that he was on the Nile, shore fishing. He caught, first, a small trout, which he carried between his teeth, while he had another in his hand. The first glided in his pharynx, and lodged there, and he was asphyxiated. All this took place half an hour before. A colleague, who saw him before I did, suggested opening the pharynx or larynx. I examined him hurriedly, and I found the following : Bloody froth about the mouth, face blue, conjunctiva injected, jaws very stiff and extremely difficult to open, muscles of extremities stiff, pulse imperceptible, respirations stridulous, slow, and interrupted, corneal reflex absent, and the boy wholly unconscious.

Treatment.—I first opened the mouth with a gag with difficulty, and introduced my finger into the mouth. I touched the tail of the fish with the end of the finger, and tried to dislodge it, without success. I then introduced a tongue forceps, and pulled with it the tongue, which was thrown backward. I gave the boy an injection of camphorated oil. I introduced a long broad forceps, caught the tail and jerked it a little and pulled ; unluckily the tail had been cut ; I tried once more, and got, at last, the fish, but, unfortunately, the child lost respiration after the fish had been got out. I at once started artificial respiration for 20 minutes, and, happily, animation was restored. I think the loss was due to sudden spasm of the glottis. He remained unconscious for 45 minutes. I restored his consciousness by all the known means, gave him an injection of strychnine, and warmed him with hot-water bottles, etc. I examined his throat afterwards, and I saw, in different positions in the walls of the pharynx, small abrasions right down to the epiglottis. Then I examined the fish, and I found it of the kind called Nile trout ; its length is 6 inches, and its greatest breadth is about 3 inches.

I examined the boy on the fourth day, and found him to be in excellent health, and I ordered him a gargle of 1 per cent. carbolic acid, and milk diet for a few days.

Practical Notes.

ADRENALIN AND PITUITRIN FOR ASTHMA.

Bensaude and Hallion report the results obtained in the treatment of asthma by a mixture of adrenalin and hypophysial extract. Each cc. of the solution contained half a milligramme of adrenaline hydrochloride and an amount of hypophysial extract, freed from albumen, corresponding to 0·25 g. of the fresh gland. It is put up in ampoules, sterilized and ready for hypodermic injection.

The dose usually given was 1 cc. each day for adults; for children the dose was decreased as nearly as possible in proportion to the weight. The mixture was given in cases of so-called essential asthma, and in a few cases of persistent spasmodic cough. Nearly all the patients treated, ranging in age from eight to over sixty years, experienced speedy relief of the asthmatic attack. The effect began to be felt in from two to five minutes after the injection, and one was enough, as a rule, to cut short the fit. It brought about so much relief that in night attacks, the most usual form, the patient was able to settle down and enjoy a good rest for the rest of the night. Not only is the immediate fit relieved, but it appears to have an influence in postponing later attacks. Patients who have been accustomed to rely upon morphia for relief have expressed their preference for this mixture. A further advantage is that the effect does not get less on repetition and a habit is not engendered.—(*Presse médicale*, No. 20.)

TREATMENT OF INFLUENZA.

Professor Paul Demiéville, of Lausanne, gives the lines on which he is of opinion that treatment should be based. There has been an increase in virulence since the outbreak of the epidemic in May of this year, and, to a large extent, this has been due to the development of the disease in thickly populated areas. With this increase in virulence influenza has very quickly shown as well particularly intense toxic qualities, from which arises vasomotor paralysis, resulting so frequently in serious complications of the lung, congestion and broncho-pneumonia. The professor believes that hypostasis has a considerable share in bringing about these ill-effects, and that these pulmonary complications, especially in the early stage, are localized at the base in consequence. A premature return to work or even getting up too quickly after the first fall of the temperature has been, together with too sudden a resumption of big meals, the most frequent cause of relapses. It is a point of capital importance, which cannot be insisted upon too strongly, so to arrange for the complete restoration of the patient's strength by avoiding even the slightest cause of exhaustion. The large doses of alcohol, so popular in lay treatment of the disease, have a most deplorable effect and, moreover, often increase the severe headache.

The patient should never be made to sit up in bed for any purpose; it is sufficient for auscultatory purposes to turn him on to his side. If it is absolutely necessary to have him in a sitting position he must be assisted and supported. He should not be purged; a simple laxative is all that is necessary. Everything liable to set up excessive sweating must be avoided,

except during the first day or two. Free diuresis should be promoted by encouraging him to drink freely of water, lemonade, or tisanes, for in this way the system will be relieved most quickly of the intoxication, thus affording speedy relief of the headache and pyrexia. In the case of intense headache an ice-bag should be applied, or cold compresses renewed every minute for half an hour. Patient should frankly be told that the fever will last two or three days, and will then disappear spontaneously. If a patient cannot be trusted to be content with this, and wants a prescription, he may be ordered an acid mixture—hydrochloric acid, 1 in 200. All anti-pyretic drugs should be withheld absolutely, for all febrifuges, even quinine, are depressants, more or less paralysing the vasomotor nerves, enfeebling the heart, and very often upsetting the stomach. All of them reduce the hæmoglobin, and generally lower the defences of the organism at a time when it is particularly urgent to support these as much as possible. Caffeine, which is generally combined with these drugs to neutralize their known depressant effects, is in no way sufficient for the purpose. The small doses of quinine given with caffeine are worse than useless, for they only promote excessive sweating.

If the temperature has not fallen after the first day or two, active measures should promptly be instituted against pneumonia and the heart failure which so often accompanies it. Counter-irritants, cupping, pneumonia-jackets, etc., should be applied, and the heart and circulation watched anxiously. Benefit will accrue by giving caffeine, digitalis, or large doses of camphor, 1 to 2 cc. of a 20 per cent. oily solution with 15 per cent. of ether added. The patient should be kept in bed in a sitting position, and, even in the gravest cases, should be lifted into an armchair and remain there for four or six hours a day. The Fowler position is as useful to physicians as to surgeons, and placing the patient in an armchair is of very great value when the heart is irregular and depressed. Kocher made a point of this in 1879.

Fluid nourishment should be given until the temperature has been normal for two days, and the return to solid food must be made gradually and cautiously. The patient should not be allowed to get up from bed until a day at least after he has been given solid food. Getting up too soon is the most fertile source of relapses.—(*Corresp. bl. für Schw. Aertze.* September 21, 1918.)

NASCENT CITRATE OF SODA.

Gaston Sardou, of Nice, considers that the intolerance for citrate of soda, often observed in patients, is due to the impurities present in the salt as usually sold. He has found in such cases that the difficulty will practically always be solved by giving the salt in a nascent state. He orders it in the proportion of 1 gramme of bicarbonate of soda mixed with one teaspoonful of lemon juice, and the dose is taken when the effervescence has died down. This proportion will be found specially valuable as the dose for relieving the burning sensation in the stomach due to hyperchlorhydria and hyperæsthesia of the stomach. The tolerance for the drug will be enhanced by the addition of a neutral salt, such as hydrate of magnesia.—(*Journ. des Praticiens*, August 24, 1918.)

Reviews of Books.

Collected Papers on Analytical Psychology   By C. G. Jung, M.D., LL.D. Edited by Dr. Constance E. Long. London : Baillière, Tindall, and Cox. Second edition. Pp. 492. 15s. net.

Dr. Jung's work gives the views of the Zurich School of Psychology, and is of great interest. In this—the second edition—among other additions, a new and important chapter on the concept of the unconscious has been added, in which this difficult subject is particularly well worked out. A description of the two types of psychology—the extro-verted, in which the adaptation to surroundings is by feeling, and the intro-verted, in which thought preceded by understanding is the method of adaptation, is very instructive. The fact that it does not lie in our power to transfer a " disposable " energy to whatever rationally chosen subject we may like, is aptly illustrated by an account of a successful business man, who, after concentrating all his energy upon his business, retired, with a view of enjoying himself with sports of various kinds. He unfortunately found that he could not transfer his " disposable " energy into these lines, with the result that he rapidly found himself in a state of hypochondriasis It is a book that everyone interested in the subject of psychology should read.

Artificial Limbs. By Broca and Ducroquet. Edited by R. C. Elmslie. Pp. 160. University of London Press. 6s. net.

This little work is one of the Military Medical Manuals published under the general editorship of Sir Alfred Keogh, who has contributed the general ntroduction.

The bulk of the manual consists of a very clearly written description, adequately illustrated, of those artificial limbs and appliances which the authors have found, in the course of a large experience with the Fédération des Mutilés, to be of the most value. Their object has been to fit each patient with the appliance best suited to the work he is going to do, rather than to supply him with an accurate imitation of the external form of a natural limb—all very well from an æsthetic point of view, but often inadequate functionally.

Chapter 2, dealing with the general principles of fitting for the lower limb—*i.e.*, how the body weight is transmitted *via* the bucket to the support— is of extreme value, not only from the point of view of how to fit the bucket, but as a guide to the surgeon where to amputate and what form of flap to adopt in order to give the patient the best possible subsequent result. It is true, as the authors point out, that often the surgeon has no choice. But in many cases he has; and, the principles once clearly grasped, many re-amputations might be saved.

Generally speaking, the authors' practice may be said to embrace the best points of the French and American methods, whilst not neglecting good ideas met with elsewhere. But, whilst appreciating fully American mech- anical ingenuity, they lay still greater stress on practical utility. This is best seen in their description of the Fédération leg, which consists of a leather and steel bucket with a peg leg, to which a show foot can be adapted for Sunday and holiday use. And again in the articulated peg leg for use after disarticulation at the hip joint. In the sections devoted to the upper limb, artificial hands and hand substitutes are particularly well done. The final chapter deals with the re-education of the disabled, and is followed by an index. Major Elmslie has translated and edited a most valuable treatise.

Preparations, Inventions, etc.

FALCONER'S ARTHROMETER.

(London : Messrs. Allen and Hanbury's, Ltd., 48 Wigmore Street, W.1.)

The illustration represents a new instrument for measuring the angles of movements of joints. It has been designed by Mr. Wilbraham Falconer, the superintendent of Mechanical Treatment in the Red Cross Clinic for the
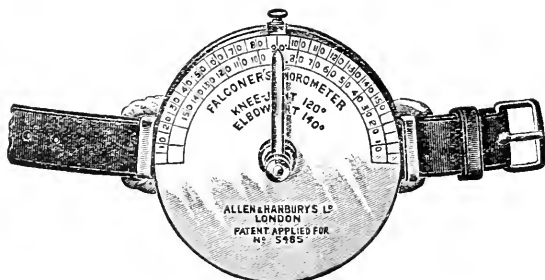
physical treatment of disabled officers. Its construction is simple, and it is easily adjusted to a limb, allowing the measurements to be taken quickly. It can be used with all joints, thus differing from the various protractors and goniometers now being used for the purpose. When properly adjusted to the limb, the measurements cannot fail to be accurate.

"EVATMINE."

(London : The British Organotherapy Co., Ltd., 22 Golden Square, W.1.)

This preparation contains :—

Pituitary extract (posterior lobe)	-	- gr. $\frac{7}{8}$.
Solution of adrenaline (1/1000)	-	- ℳ viii.
Normal salt solution	-	- ℳ viii

The combination of these two drugs has recently been found to be of considerable service for the relief of asthma, and there is now a good deal of clinical experience testifying to its good results in the treatment of this complaint. A dose given by hypodermic injection brings about relief of the actual attack in from two to five minutes, and, moreover, has a decided effect in postponing further attacks. The relief experienced is usually so complete that the patient is able to go comfortably to sleep for some hours.

The action of adrenalin has been known for some time in this connection, the pituitrin acts more slowly, but has a more lasting effect. A threatened attack can be averted by giving an injection.

The preparation is issued in sterilized ampoules containing 1 cc.

GENERAL INDEX

TO VOLUME CI.

———◆◆◆———

INDEX TO NAMES AND SUBJECTS.

ILLUSTRATIONS.